

FedEx Tracking No. 779193135673

May 22, 2017

West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street SE
Charleston, WV 25304

RE: Air Permit Registration Application
Cunningham Energy, LLC
Cochran and King Pad

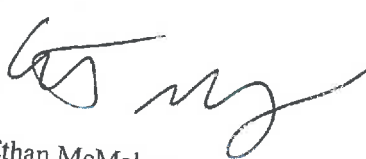
To Whom It May Concern:

On behalf of Cunningham Energy, LLC, COMM Engineering is submitting the Air Permit Registration Application for the Cochran and King Pad. The Cochran and King Pad is a condensate/crude oil and natural gas production facility located in Clay County, West Virginia. The application and all necessary attachments are enclosed with one original paper copy and three paper copies. A submittal fee in the amount of \$4,500.00 is included (Check #24942).

A copy of the Air Quality Permit Notice for the advertisement is included as Attachment P. As the Notice is being submitted simultaneously with the application, the official affidavit of publication will be submitted to the Division of Air Quality separately once it is completed.

We appreciate your prompt attention and approval of this submittal. If you have any questions regarding the permit application, please contact Ethan McMahon at (337) 237-4373 or ermcmahon@commengineering.com.

Sincerely,


Ethan McMahon
Environmental Engineer

cc: Ryan Cunningham, Cunningham Energy, LLC

COMM ENGINEERING | PO Box 53463 Lafayette, Louisiana 70505-3463





MINOR SOURCE AIR QUALITY APPLICATION

CUNNINGHAM ENERGY, LLC
COCHRAN AND KING PAD
BOMONT, CLAY COUNTY, WEST VIRGINIA

MAY 2017



www.commengineering.com

Phone: (337) 237-4373

Fax: (337) 234-1805

Minor Source Air Quality Application

**Cunningham Energy, LLC
Cochran and King Pad**

- Attachment A Business Certificate
- Attachment B Map(s)
- Attachment C Installation and Start Up Schedule
- Attachment D Regulatory Discussion
- Attachment E Plot Plan
- Attachment F Detailed Process Flow Diagram(s)
- Attachment G Process Description
- Attachment H Material Safety Data Sheets (MSDS)
- Attachment I Emission Units Table
- Attachment J Emission Points Data Summary Sheet
- Attachment K Fugitive Emissions Data Summary Sheet
- Attachment L Emission Unit Data Sheet(s)
- Attachment M: Air Pollution Control Device Sheet(s)
- Attachment N Supporting Emissions Calculations
- Attachment O Monitoring/Recordkeeping/Reporting/Testing Plans
- Attachment P Public Notice
- Attachment R Authority Forms



WEST VIRGINIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475

www.dep.wv.gov/daq

**APPLICATION FOR NSR PERMIT
AND
TITLE V PERMIT REVISION
(OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):

- ☒ CONSTRUCTION ☐ MODIFICATION ☐ RELOCATION
☐ CLASS I ADMINISTRATIVE UPDATE ☐ TEMPORARY
☐ CLASS II ADMINISTRATIVE UPDATE ☒ AFTER-THE-FACT

PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):

- ☐ ADMINISTRATIVE AMENDMENT ☐ MINOR MODIFICATION
☐ SIGNIFICANT MODIFICATION

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION
INFORMATION AS ATTACHMENT S TO THIS APPLICATION

**FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options
(Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.**

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office):
Cunningham Energy, LLC

2. Federal Employer ID No. (FEIN):
26-2169186

3. Name of facility (if different from above):
Cochran and King Pad

4. The applicant is the:
☐ OWNER ☐ OPERATOR ☒ BOTH

5A. Applicant's mailing address:
3230 Pennsylvania Ave.
Charleston, WV 25302

5B. Facility's present physical address:
Shelton Rd. (38.427525, -81.220647)

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ YES ☐ NO
- If YES, provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A**.
- If NO, provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A**.

7. If applicant is a subsidiary corporation, please provide the name of parent corporation:

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site*? ☒ YES ☐ NO
- If YES, please explain: Applicant owns the proposed site.

- If NO, you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated or temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Natural gas and crude oil/condensate production facility

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated or temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Natural gas and crude oil/condensate production facility

10. North American Industry Classification System (NAICS) code for the facility:

211111

11A. DAQ Plant ID No. (for existing facilities only):
015 - 00018

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates or Temporary permits** at an existing facility, please provide directions to the present location of the facility from the nearest state road;
- For **Construction or Relocation permits**, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment B**.

From Bomont, WV: Travel east on CR-1 for 2.0 miles. Turn east on CR-6 for 1.2 miles. Turn north on local roads for 76 yards. Arrive at location.

12.B. New site address (if applicable):
Shelton Rd.

12C. Nearest city or town:
Bomont

12D. County:
Clay

12.E. UTM Northing (KM): 4253274.6

12F. UTM Easting (KM): 480740.8

12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
This application will combine two well pads into one minor source air quality permit. The Cochran Well Pad (G70-D223) and the King Well Pad are located 1,500 feet apart and share the same control equipment (VRU and Combustor).

14A. Provide the date of anticipated installation or change: / /

- If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: 4/12/2017

14B. Date of anticipated Start-Up if a permit is granted: / /

14C. Provide a **Schedule** of the planned **Installation of/Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☐ YES ☒ NO

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (if known). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (if known). Provide this information as **Attachment D**.

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan**, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to **Plot Plan Guidance**).

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F**.

23. Provide a **Process Description** as **Attachment G**.

– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H**.

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I**.

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J**.

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K**.

28. Check all applicable **Emissions Unit Data Sheets** listed below:

<input checked="" type="checkbox"/> Bulk Liquid Transfer Operations	<input type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry
<input type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities
<input type="checkbox"/> Concrete Batch Plant	<input type="checkbox"/> Incinerator	<input checked="" type="checkbox"/> Storage Tanks
<input type="checkbox"/> Grey Iron and Steel Foundry	<input type="checkbox"/> Indirect Heat Exchanger	
<input type="checkbox"/> General Emission Unit, specify		

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L**.

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

<input type="checkbox"/> Absorption Systems	<input type="checkbox"/> Baghouse	<input type="checkbox"/> Flare
<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector
<input type="checkbox"/> Afterburner	<input type="checkbox"/> Electrostatic Precipitator	<input type="checkbox"/> Wet Collecting System
<input checked="" type="checkbox"/> Other Collectors, specify VRU and Combustor		

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M**.

30. Provide all **Supporting Emissions Calculations** as **Attachment N**, or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.

➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and **Example Legal Advertisement** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ YES ☒ NO

➤ If YES, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's "Precautionary Notice - Claims of Confidentiality" guidance found in the **General Instructions** as Attachment Q.

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☒ Authority of Corporation or Other Business Entity

☐ Authority of Partnership

☐ Authority of Governmental Agency

☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as Attachment R.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE  (Please use blue ink)

DATE: 5/18/17 (Please use blue ink)

35B. Printed name of signee: Ryan Cunningham

35C. Title: President

35D. E-mail:
ryan.cunningham@cunninghamenergy.com

36E. Phone: 304-344-9291

36F. FAX: 304-344-9290

36A. Printed name of contact person (if different from above): Ethan McMahon

36B. Title: Environmental Engineer

36C. E-mail:
ermcmahon@commengineering.com

36D. Phone: 337-237-4373

36E. FAX: 337-234-1805

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Attachment A: Business Certificate | <input checked="" type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet |
| <input checked="" type="checkbox"/> Attachment B: Map(s) | <input checked="" type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s) |
| <input checked="" type="checkbox"/> Attachment C: Installation and Start Up Schedule | <input checked="" type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s) |
| <input checked="" type="checkbox"/> Attachment D: Regulatory Discussion | <input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations |
| <input checked="" type="checkbox"/> Attachment E: Plot Plan | <input checked="" type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans |
| <input checked="" type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s) | <input checked="" type="checkbox"/> Attachment P: Public Notice |
| <input checked="" type="checkbox"/> Attachment G: Process Description | <input type="checkbox"/> Attachment Q: Business Confidential Claims |
| <input checked="" type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS) | <input checked="" type="checkbox"/> Attachment R: Authority Forms |
| <input checked="" type="checkbox"/> Attachment I: Emission Units Table | <input type="checkbox"/> Attachment S: Title V Permit Revision Information |
| <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" type="checkbox"/> Application Fee |

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ Forward 1 copy of the application to the Title V Permitting Group and:
- ☐ For Title V Administrative Amendments:
 - ☐ NSR permit writer should notify Title V permit writer of draft permit,
- ☐ For Title V Minor Modifications:
 - ☐ Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,
 - ☐ NSR permit writer should notify Title V permit writer of draft permit.
- ☐ For Title V Significant Modifications processed in parallel with NSR Permit revision:
 - ☐ NSR permit writer should notify a Title V permit writer of draft permit,
 - ☐ Public notice should reference both 45CSR13 and Title V permits,
 - ☐ EPA has 45 day review period of a draft permit.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

Attachment A



*I, Betty Ireland, Secretary of State of the
State of West Virginia, hereby certify that*

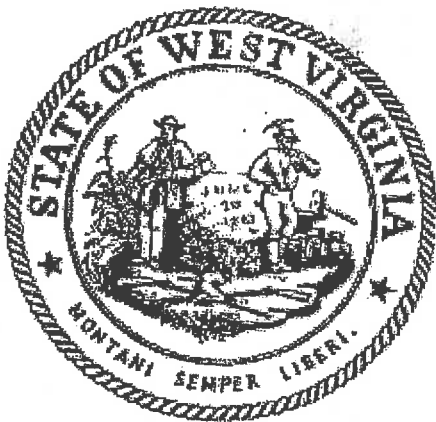
CUNNINGHAM ENERGY LLC

Control Number: 10526

has filed its "Articles of Organization" in my office according to the provisions of West Virginia Code §§31B-2-203 and 206. I hereby declare the organization to be registered as a limited liability company from its effective date of March 10, 2008 until the expiration of the term or termination of the company.

Therefore, I hereby issue this

CERTIFICATE OF A LIMITED LIABILITY COMPANY



*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
March 10, 2008*

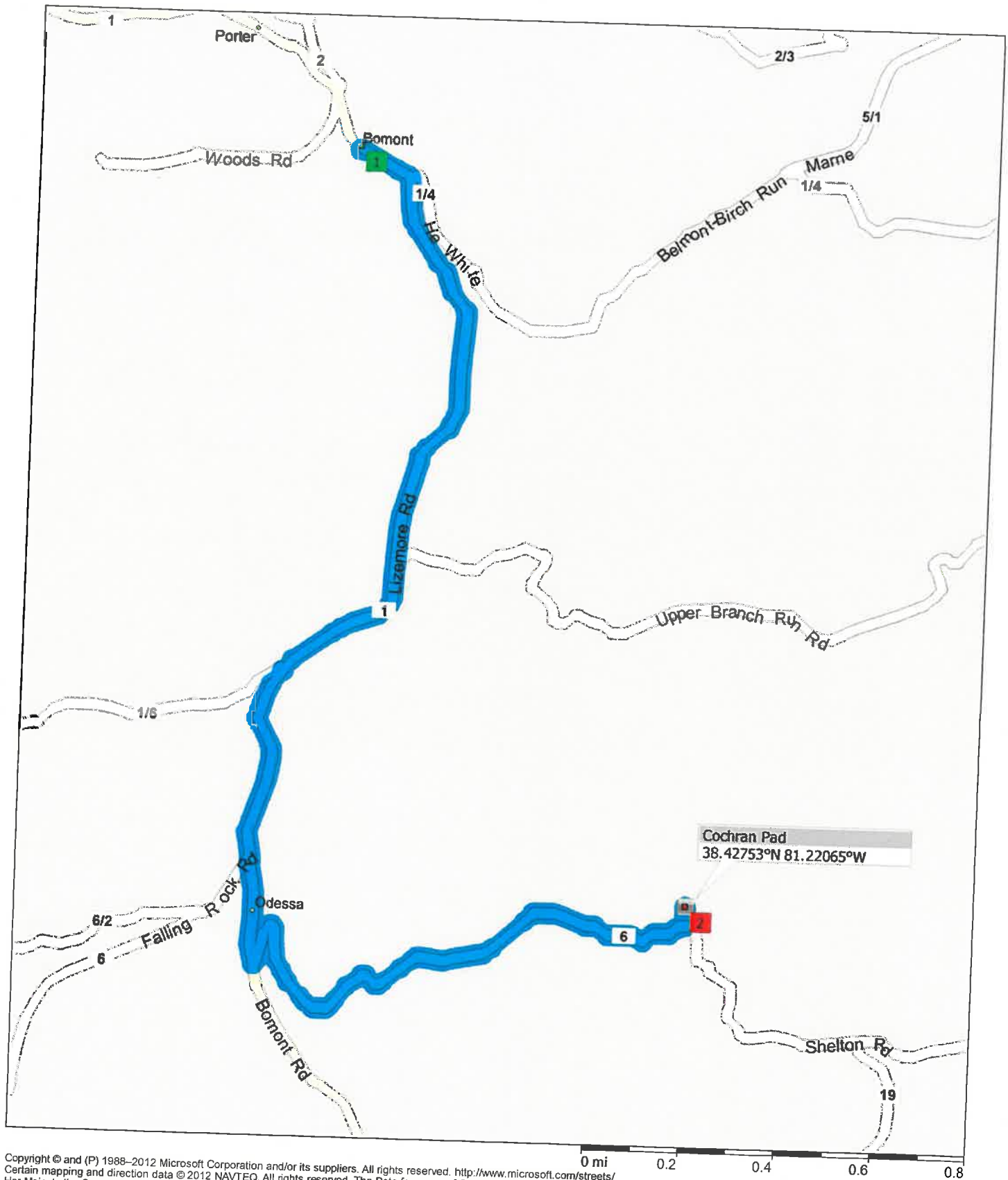
Betty Ireland

Secretary of State

Attachment B

Cunningham Energy, LLC - Cochran and King Pad

3.3 miles; 7 minutes



9:00 AM	0.0 mi	1 Depart Bomont on CR-1 [Lizemore Rd] (East) for 1.8 mi
9:03 AM	1.8 mi	Keep STRAIGHT onto CR-1 [Bomont Rd] for 0.2 mi
9:03 AM	2.0 mi	Turn LEFT (East) onto CR-6 [Shelton Rd] for 1.2 mi
9:07 AM	3.2 mi	Bear LEFT (North) onto Local road(s) for 76 yds
9:07 AM	3.3 mi	2 Arrive Cochran Pad

Cunningham Energy, LLC

Cochran and King Pad

Legend

King (38.42740, -81.22660)

Cochran (38.427525, -81.220647)

6

Google earth

© 2016 Google



Attachment C

Cunningham Energy, LLC Cochran and King Pad

Installation and Start Up Schedule

The Cochran and King Pad is fully operational but not currently producing.

Cunningham Energy, LLC is waiting for permit approval and DAQ system installation.

Attachment D

Cunningham Energy, LLC Cochran and King Pad

Regulatory Discussion

The Cochran and King Pad will comply with all registration and reporting requirements as necessary, as well as comply with all federal and state emissions standards.

Federal Regulations

Standard of Performance for New Stationary Sources – 40 CFR Part 60

1. Subpart A – General Provisions.
Applicability: Applies if any other NSPS subpart applies.
2. Subparts K, Ka, Kb - Standards for Storage Vessels for Petroleum Liquids.
Applicability: Does Not Apply - Facility handles crude prior to lease custody transfer.
3. Subpart GG – Standards of Performance for Stationary Gas Turbines.
Applicability: Does Not Apply – No stationary gas turbines are located onsite.
4. Subpart JJJJ – Standard of Performance for Stationary Spark Ignition Internal Combustion Engines.
Applicability: Does Not Apply – VRU Natural Gas Compressor Engine was manufactured before July 1, 2007. Manufacture data was 7/1980.
5. Subpart KKK – Standards for Equipment Leaks of VOCs from Onshore Gas Plants.
Applicability: Does Not Apply – Facility is not a gas plant. No VOC leak monitoring required for non-gas plant E & P facilities.
6. Subpart LLL – Standards for Onshore Gas Processing: SO₂ Emissions.
Applicability: Does Not Apply – Facility does not have a gas sweetening unit.
7. Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production Transmission, and Distribution.
Applicability: Applies – Facility was constructed after August 23, 2011. The facility has a reciprocating compressor, storage vessels, and pneumatic controllers. Pneumatic Controllers are low bleed with < 6 scfh bleed rate. Storage vessels VOC emissions are less than 6 tons per year.
8. Subpart OOOOa – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015.
Applicability: Applies – Facility was constructed after September 18, 2015. Facility will be required to conduct fugitive emissions LDAR monitoring.

National Emission Standards for Hazardous Air Pollutants for Source Categories – 40 CFR Part 63

1. Subpart A – General Provisions.
Applicability: Applies if any other subpart applies.
2. Subpart HH – National Emissions Standards for HAPs from Oil and Natural Gas Production Facilities.
Applicability: Exempt – Facility is a minor source of air toxics.

3. Subpart HHH – National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities.
Applicability: Does Not Apply – Not a major source of HAP emissions and is prior to the gas transmission and storage phase.
4. Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.
Applicability: Applies – The VRU Natural Gas Compressor Engine will meet Subpart ZZZZ standards.

Prevention of Significant Deterioration (PSD) – 40 CFR 52.

Applicability: Does Not Apply – Facility is a new source and criteria pollutant emission levels are less than 250 tons per year.

Operating Permits - 40 CFR 70.

Applicability: Does Not Apply – Facility is not required to submit an application for a Part 70 (Title V) Air Permit.

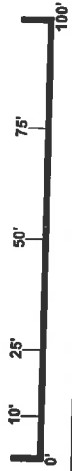
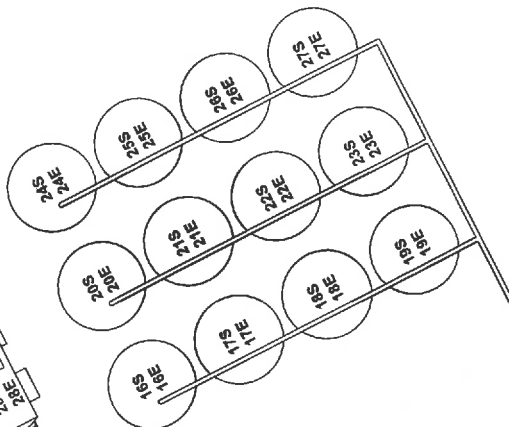
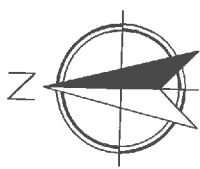
State Regulations

West Virginia SIP Regulations – Title 45 Legislative Rule.

The following Title 45 Legislative Rules will be applicable to the Cochran and King Pad:

1. 45CSR2 – To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers.
2. 45CSR4 – To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors.
3. 45CSR6 – Control of Air Pollution from Combustion of Refuse.
4. 45CSR8 – Ambient Air Quality Standards.
5. 45CSR11 – Prevention of Air Pollution Emergency Episodes.
6. 45CSR13 – Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation.
7. 45CSR16 – Standards of Performance for New Stationary Sources Pursuant to 40 CFR, Part 60.
8. 45CSR20 – Good Engineering Practice as Applicable to Stack Heights.
9. 45CSR22 – Air Quality Management Fee Program.
10. 45CSR27 – To Prevent and Control the Emissions of Toxic Air Pollutants.
11. 45CSR38 – Provisions for Determination of Compliance with Air Quality Management Rules.

Attachment E



PROJECT NO.	151543-PP-101	COLUMBIA CUNNINGHAM ENERGY
LOCATION	SECTION DATE	
JMS	10/20/16	
OWNER	DRAWN DATE	
COCH	08/20/17	
CHANGES	DATE	
NO CHANGES		
DESIGNED FOR APPROVAL	PER DATE	
APPROVED FOR CONSTRUCTION	PER DATE	
NO	NO	
151543	151543	
PP-101	PP-101	
2	2	
1	1	

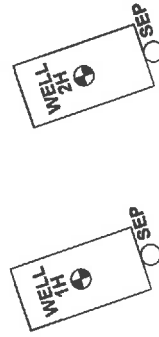
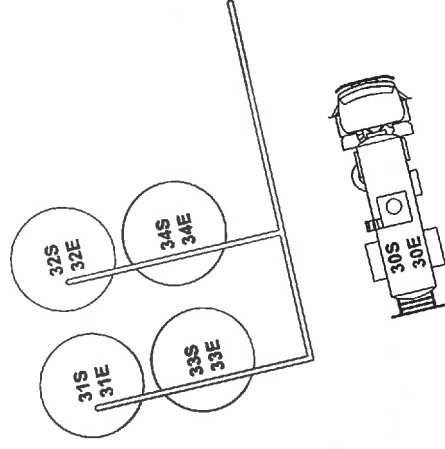
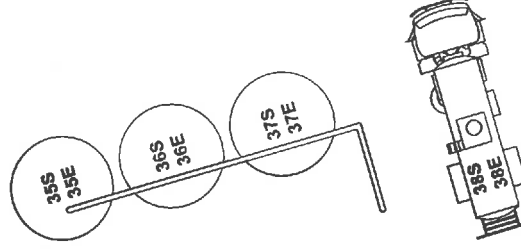
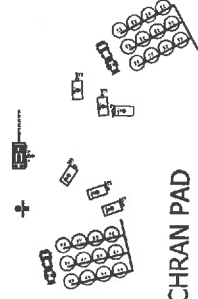
KING PAD



1/8 MILE

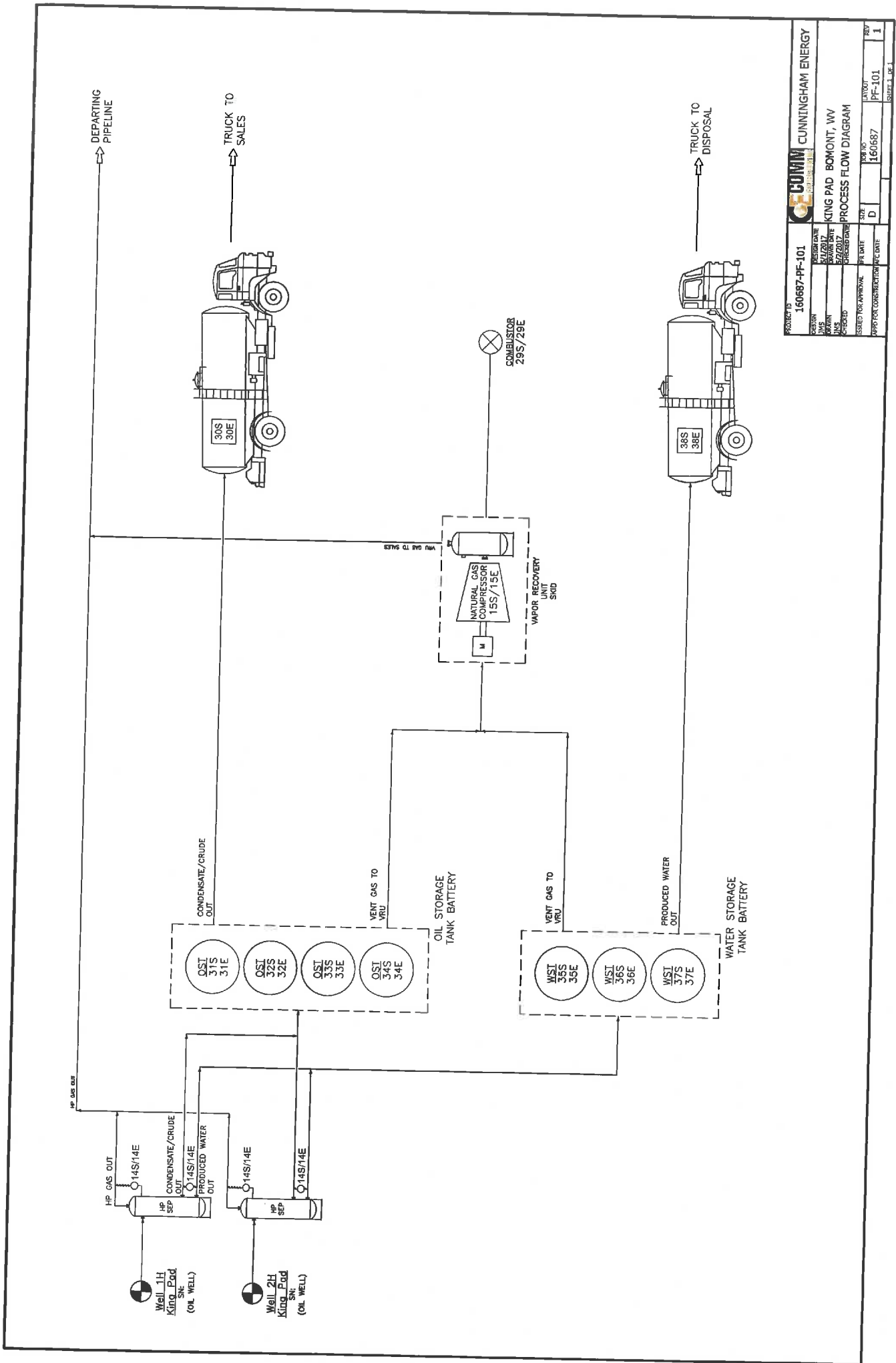
1/4 MILE

COCHRAN PAD



PROJECT ID 160687-PP-101		CUNNINGHAM ENERGY	
DESIGN	DATE	DESIGN	DATE
DWG	5/4/2017	DWG	5/4/2017
CHECKED	5/4/2017	CHECKED	5/4/2017
ISSUED FOR APPROVAL		PLOT PLAN	
DATE	DATE	DATE	DATE
160687	160687	160687	160687
PP-101	PP-101	PP-101	PP-101
SHEET 1 OF 1		SHEET 1 OF 1	

Attachment F



PROJECT ID		160687-PF-101		CUNNINGHAM ENERGY	
LOCATION		KING PAD BOMONT, WV		PROCESS FLOW DIAGRAM	
DATE		5/1/2017		ISSUED FOR APPROVAL	
BY		[Signature]		DATE	
CHECKED		[Signature]		DATE	
ISSUED FOR APPROVAL		DATE		DATE	
APPROVED FOR CONSTRUCTION		DATE		DATE	
SIZE		D		LAYOUT	
JOB NO		160687		REV	
PF-101		1		SHEET 1 OF 1	

Attachment G

Cunningham Energy, LLC

Cochran and King Pad

Process Description

The Cochran and King Pad is a crude oil and natural gas production facility in Clay County, West Virginia, which handles sweet natural gas (less than 24 ppm H₂S) and condensate/crude oil. The Cochran and King Pad are being permitted as one facility because they share control equipment and are located less than 1,500 feet apart.

Cochran Pad:

The Cochran Pad annually processes approximately:

21,900 barrels of condensate/crude oil,
47.45 million standard cubic feet natural gas, and
13,140 barrels of produced water.

Separation

Production from six on site wells flows to one of six high pressure, three phase separators. Each separator contains two pneumatic controllers (Unit/Point ID: 14S / 14 E). Natural gas is sent directly to the sales pipeline. Condensate/crude oil flows to the Oil Storage Tanks (Unit/Point ID: 2S – 13S / 2E – 13E). Produced water flows to the Water Storage Tanks (Unit/Point ID: 16S – 27S / 16E – 27E).

Condensate/Crude Oil Storage and Load Out

Condensate/crude oil is stored in twelve (12) 210 barrel Oil Storage Tanks (Unit/Point ID: 2S – 13S / 2E – 13E). Flash, standing, and working losses are vented to Vapor Recovery System (Unit/Point ID: 1C / 1C) with a 95 % capture efficiency. The Vapor Recovery System is powered by the VRU Natural Gas Compressor Engine (Unit/Point ID: 15S / 15E). The vapors recovered by the Vapor Recovery System are sent directly to the sales pipeline. The stored condensate/crude oil is shipped via tank trucks to sales. Volatile Organic Compounds (VOCs) emissions resulting from the Tank Truck Oil/Condensate Loading Losses (Unit/Point ID: 1S / 1E) are vented to the atmosphere. The facility handles condensate/crude oil prior to lease custody transfer.

Produced Water Storage and Disposal

Produced water is stored in twelve (12) 210 barrel Water Storage Tanks (Unit/Point ID: 16S – 27S / 16E – 27E). Flash, standing, and working losses are vented to Vapor Recovery System (Unit/Point ID: 1C / 1C) with a 95 % capture efficiency. The Vapor Recovery System is powered by the VRU Natural Gas Compressor Engine (Unit/Point ID: 15S / 15E). The vapors recovered by the Vapor Recovery System are sent directly to the sales pipeline. The stored produced water is shipped via tank trucks for disposal. Volatile Organic Compounds (VOCs) emissions resulting from the Tank Truck Water Loading Losses (Unit/Point ID: 28S / 28E) are vented to the atmosphere.

King Pad:

The King Pad annually processes approximately:

14,600 barrels of condensate/crude oil,
21,900 barrels of produced water.

Separation

Production from two on site wells flows to one of two high pressure, three phase separators. Each separator contains two pneumatic controllers (Unit/Point ID: 14S / 14 E). Natural gas is sent directly to the Cochran Pad. Condensate/crude oil flows to the Oil Storage Tanks (Unit/Point ID: 31S – 34S / 31E – 34E). Produced water flows to the Water Storage Tanks (Unit/Point ID: 35S – 37S / 35E – 37E).

Condensate/Crude Oil Storage and Load Out

Condensate/crude oil is stored in four (4) 210 barrel Oil Storage Tanks (Unit/Point ID: 31S – 34S / 31E – 34E). Flash, standing, and working losses are vented to Vapor Recovery System (Unit/Point ID: 1C / 1C) with a 95 % capture efficiency. The Vapor Recovery System is powered by the VRU Natural Gas Compressor Engine (Unit/Point ID: 15S / 15E). The vapors recovered by the Vapor Recovery System are sent directly to the sales pipeline. The stored condensate/crude oil is shipped via tank trucks to sales. Volatile Organic Compounds (VOCs) emissions resulting from the Tank Truck Oil/Condensate Loading Losses (Unit/Point ID: 30S / 30E) are vented to the atmosphere. The facility handles condensate/crude oil prior to lease custody transfer.

Produced Water Storage and Disposal

Produced water is stored in three (3) 210 barrel Water Storage Tanks (Unit/Point ID: 35S – 37S / 35E – 37E). Flash, standing, and working losses are vented to Vapor Recovery System (Unit/Point ID: 1C / 1C) with a 95 % capture efficiency. The Vapor Recovery System is powered by the VRU Natural Gas Compressor Engine (Unit/Point ID: 15S / 15E). The vapors recovered by the Vapor Recovery System are sent directly to the sales pipeline. The stored produced water is shipped via tank trucks for disposal. Volatile Organic Compounds (VOCs) emissions resulting from the Tank Truck Water Loading Losses (Unit/Point ID: 38S / 38E) are vented to the atmosphere.

Cochran and King Pad:**Miscellaneous Sources**

Fugitive natural gas and light liquid emissions (Unit/Point ID: FE-01) occur from potential leaks from flanges, valves, and piping connections. Fugitive emissions are calculated using typical Cunningham Energy, LLC facility component counts and emission factors in EPA 4531, R-95-017.

Site contains 8 electric pump engines (10 Horsepower).

A Back-up Combustor (Unit/Point ID: 29S / 29 E) is used onsite in the event of VRU maintenance or emergency.

Site specific oil analysis was available and used for all respective calculations (included in attachment N). Site specific gas analysis was not available. A representative gas analysis from the EPA average emission factors was used for all applicable calculations (included in attachment S).

Attachment H



SAFETY DATA SHEET

SECTION 1 : IDENTIFICATION

Product Name: Crude Oil, Sweet
Synonyms: Crude Oils, Desalted, Sweet, Field Crude, Petroleum Crude, Petroleum Oil, Rock Oil, Separator Crude, Sweet Crude, Crude Oils
Product Use/Restriction: Refinery Feed
Manufacturer Name: Cunningham Energy, LLC
Address: 3230 Pennsylvania Ave
Charleston, WV 25302
General Phone Number: (304) 344-9291
Emergency Phone Number: Steve Rhodes (843) 446-9698



HMIS	
Health Hazard	2*
Fire Hazard	3
Reactivity	1
Personal Protection	X

* Chronic Health Effects

SECTION 2 : HAZARD(S) IDENTIFICATION

GHS Pictograms:



Signal Word:

Danger.

GHS Class:

Extremely flammable liquid and vapor Category 1.
Aspiration Hazard, Category 1.
Eye Irritant, Category 2.
Specific Target Organ Toxicity, Single Exposure, Category 3.
Specific Target Organ Toxicity, Repeated Exposure, Category 2.
Carcinogen, Category 1B.
Hazardous to the aquatic environment, long-term, chronic, Category 2.

Hazard Statements:

H224 - Extremely flammable liquid and vapor
H304 - May be fatal if swallowed and enters airways.
H319 - Causes serious eye irritation.
H336 - May cause drowsiness or dizziness.
H373 - May cause damage to organs through prolonged or repeated exposure.
H351 - Suspected of causing cancer.
H411 - Toxic to aquatic life with long lasting effects.

Hazards not otherwise classified

May contain or release poisonous hydrogen sulfide gas

Precautionary Statements:

Keep away from heat/sparks/open flames/hot surfaces. — No smoking.
Ground/Bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
In case of fire: Use dry chemical, carbon dioxide to extinguish small fires. Use water for large fires.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash hands thoroughly after handling.
Wear protective gloves/protective clothing/eye protection/face protection.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep container tightly closed. Store in a well-ventilated place. Keep cool.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
Contaminated work clothing should not be allowed out of the workplace.
IF SWALLOWED: Immediately call a POISON CENTER/doctor/... Do not induce vomiting.
Get medical advice/attention if you feel unwell.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.
Collect spillage.
Avoid release to the environment.
Dispose of contents/container in accordance with Local, State, Federal and Provincial regulations.

Emergency Overview:

DANGER! Extremely Flammable. Pulmonary aspiration hazard if swallowed.
Eye and Skin irritant

Route of Exposure:

Eyes. Skin. Inhalation. Ingestion.

Potential Health Effects:

Eye:

Causes serious eye irritation

Skin:	Causes mild skin irritation. Repeated exposure may cause skin dryness or cracking
Inhalation:	May cause drowsiness and dizziness.
Ingestion:	May be fatal if swallowed and enters airways.
Physical Health Hazard:	This material may contain varying concentrations of polycyclic aromatic hydrocarbons (PAHs) which have been known to produce a phototoxic reaction when contaminated skin is exposed to sunlight. The effect is similar in appearance to an exaggerated sunburn, and is temporary in duration if exposure is discontinued. Continued exposure to sunlight can result in more serious skin problems including pigmentation (discoloration), skin eruptions (pimples), and possible skin cancers. This material may contain or liberate hydrogen sulfide, a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats, convulsions, respiratory failure, and death.
Signs/Symptoms:	Effects of overexposure may include irritation of the digestive tract, irritation of the respiratory tract, nausea, vomiting, diarrhea and signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).
Target Organs:	May cause damage to organs through prolonged or repeated exposure. Laboratory animal studies of crude oil by the dermal and inhalation exposure routes have demonstrated toxicity to the liver, blood, spleen and thymus
Aggravation of Pre-Existing Conditions:	Not expected to be a sensitizer

SECTION 3 : COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Ingredient Percent	EC Num.
Crude Oil (Petroleum)	8002-05-9	100 by weight	
N-Hexane	110-54-3	<5 by Volume	
Ethyl Benzene	100-41-4	<3 by weight	
Xylenes	1330-20-7	<1 by weight	
Benzene	71-43-2	<1 by weight	
Hydrogen Sulfide	7783-06-4	<0.2 by Volume	
Naphthalene	91-20-3	0 - 0.9 by weight	
Total Sulfur:	< 0.5 wt%		
Crude oil, natural gas and natural gas condensate can contain minor amounts of sulfur, nitrogen and oxygen containing organic compounds as well as trace amounts of heavy metals like mercury, arsenic, nickel, and vanadium. Composition can vary depending on the source of crude.			

SECTION 4 : FIRST AID MEASURES

Eye Contact:	Immediately flush eyes with plenty of water for at least 15 to 20 minutes. Ensure adequate flushing of the eyes by separating the eyelids with fingers. Get immediate medical attention. Remove contacts if present and easy to do.
Skin Contact:	Immediately wash skin with plenty of soap and water for 15 to 20 minutes, while removing contaminated clothing and shoes. Get medical attention if irritation develops or persists.
Inhalation:	If inhaled, remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.
Ingestion:	Aspiration hazard. Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.
Note to Physicians:	At high concentrations hydrogen sulfide may produce pulmonary edema, respiratory depression, and/or respiratory paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. Animal studies suggest that nitrites are a useful antidote, however, documentation of the efficacy of nitrites in humans is lacking. If the diagnosis of hydrogen sulfide poisoning is confirmed and if the patient does not respond rapidly to supportive care, the use of nitrites may be an effective antidote if delivered within the first few minutes of exposure. For adults the dose is 10 mL of a 3% NaNO ₂ solution (0.5 gm NaNO ₂ in 15 mL water) I.V. over 2-4 minutes. The dosage should be adjusted in children or in the presence of anemia, and methemoglobin levels, arterial blood gases, and electrolytes should be monitored closely. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias. Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.
Other First Aid:	Before attempting rescue, first responders should be alert to the possible presence of hydrogen sulfide, a poisonous gas with the smell of rotten eggs, and should consider the need for respiratory protection (see Section 8). Remove casualty to fresh air as quickly as possible. Immediately begin artificial respiration if breathing has ceased. Consider whether oxygen administration is needed. Obtain medical advice for further treatment
Most important symptoms and effects	Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue Delayed: Dry skin and possible irritation with repeated or prolonged exposure.

SECTION 5 : FIRE FIGHTING MEASURES

Flammable Properties:	Extremely flammable.
Flash Point:	<-20°F (<-29°C)
Flash Point Method:	Manual ASTM D53
Auto Ignition Temperature:	Not determined.
Lower Flammable/Explosive Limit:	Not determined.
Upper Flammable/Explosive Limit:	Not determined.
Fire Fighting Instructions:	Long-duration fires involving crude or residual fuel oil stored in tanks may result in a boilover. The contents of the tank may be expelled beyond the containment dikes or ditches. All personnel should be kept back a safe distance when a boilover is anticipated (reference NFPA 11 or API 2021). For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.
Extinguishing Media:	Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.
Protective Equipment:	As in any fire, wear Self-Contained Breathing Apparatus (SCBA), MSHA/NIOSH (approved or equivalent) and full protective gear.
Unusual Fire Hazards:	This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.
Hazardous Combustion Byproducts:	Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Hydrogen sulfide and oxides of nitrogen and sulfur may also be formed. Hazardous combustion/decomposition products, including hydrogen sulfide, may be released by this material when exposed to heat or fire. Use caution and wear protective clothing, including respiratory protection.
NFPA Ratings:	
NFPA Health:	2
NFPA Flammability:	3
NFPA Reactivity:	0

SECTION 6 : ACCIDENTAL RELEASE MEASURES

Personnel Precautions:	Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. May contain or release poisonous hydrogen sulfide gas. If the presence of dangerous amounts of H ₂ S around the spilled product is suspected, additional or special actions may be warranted, including access restrictions and use of protective equipment. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.
Environmental Precautions:	Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use foam on spills to minimize vapors. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shore lines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).
Methods for containment:	Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken. Notify relevant authorities in accordance with all applicable regulations.
Methods for cleanup:	Immediate cleanup of any spill is recommended. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

SECTION 7 : HANDLING and STORAGE

Handling:	Extremely Flammable. May vaporize easily at ambient temperatures. Keep away from ignition sources such as heat/sparks/open flame – No smoking. Take precautionary measures against static discharge. Nonsparking tools should be used. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas. Open container slowly to relieve any pressure. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. May contain or release dangerous levels of hydrogen sulfide. Do not breathe vapors or mists. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Use
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good personal hygiene practices and wear appropriate personal protective equipment (see section 8). Electrostatic charge may accumulate and create a hazardous condition when handling or processing this material. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-70 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

Storage:

This material may contain or release poisonous hydrogen sulfide gas. In a tank, barge, or other closed container, the vapor space above this material may accumulate hazardous concentrations of hydrogen sulfide. Check atmosphere for oxygen content, H₂S, and flammability prior to entry. Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post area "No Smoking or Open Flame." Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes. "Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Special Handling Procedures:

Mercury and other heavy metals may be present in trace quantities in crude oil, raw natural gas, and condensates. Production and processing of these materials can lead to "drop-out" of elemental mercury in enclosed vessels and pipe work, typically at the low point of any process equipment because of its density. Mercury may also occur in other process system deposits such as sludges, sands, scales, waxes, and filter media. Personnel engaged in work with equipment where mercury deposits might occur (confined space entry, sampling, opening drain valves, draining process lines, etc), may be exposed to a mercury hazard (see sections 3 and 8).

Hygiene Practices:

Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace.

SECTION 8 : EXPOSURE CONTROLS, PERSONAL PROTECTION - EXPOSURE GUIDELINES

Engineering Controls:

Use appropriate engineering control such as process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Good general ventilation should be sufficient to control airborne levels. Where such systems are not effective wear suitable personal protective equipment, which performs satisfactorily and meets OSHA or other recognized standards. Consult with local procedures for selection, training, inspection and maintenance of the personal protective equipment.

Eye/Face Protection:

Wear appropriate protective glasses or splash goggles as described by 29 CFR 1910.133, OSHA eye and face protection regulation, or the European standard EN 166.

Skin Protection Description:

Wear appropriate protective gloves and other protective apparel to prevent skin contact. Consult manufacturer's data for permeability data.

Hand Protection Description:

Suggested protective materials: Nitrile

Respiratory Protection:

Where there is potential for airborne exposure to hydrogen sulfide (H₂S) above exposure limits, a NIOSH approved, self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode should be used. Under conditions where hydrogen sulfide (H₂S) is NOT detected, a NIOSH certified air purifying respirator equipped with organic vapor cartridges/canisters may be used. A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH). If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29CFR 1910.1028 - Benzene). Workplace monitoring plans should consider the possibility that heavy metals such as mercury may concentrate in processing vessels and equipment presenting the possibility of exposure during various sampling and maintenance operations. Implement appropriate respiratory protection and the use of other protective equipment as dictated by monitoring results (See Sections 2 and 7).

Other Protective:

Facilities storing or utilizing this material should be equipped with an eyewash and a deluge shower safety station.

PPE Pictogram s:



EXPOSURE GUIDELINES

Crude Oil (Petroleum) :

Guideline User Defined: ConocoPhillips Guidelines
TWA: 100 mg/m³ - 8 hr

N-Hexane :

Guideline ACGIH: Skin: Yes.
TLV-TWA: 50 ppm
PEL-TWA: 500 ppm

Guideline OSHA:

Ethyl Benzene :

Guideline ACGIH: TLV-TWA: 20 ppm
PEL-TWA: 100 ppm

Guideline OSHA:

Xylenes :

Guideline ACGIH: TLV-STEL: 150 ppm
TLV-TWA: 100 ppm

Benzene :

Guideline ACGIH: Skin: Yes.
TLV-STEL: 2.5 ppm
TLV-TWA: 0.5 ppm

Guideline OSHA:

PEL-TWA: 1 ppm
PEL-STEL: 5 ppm
ConocoPhillips Guidelines

Guideline User Defined:

	TW A: 0.2 mg/m ³ (as total of 17 PNA's measured by NIOSH Method 5506)
Hydrogen Sulfide :	
Guideline ACGIH:	TLV-STEL: 5 ppm TLV-TWA: 1 ppm TLV-TWA: 1 ppm TLV-STEL: 5 ppm
Guideline OSHA:	PEL-Ceiling/Peak: 20 ppm PEL-Ceiling/Peak: 50 ppm Peak
Guideline User Defined:	ConocoPhillips Guidelines TWA: 5 ppm 8hr TW A: 2.5 ppm 12hr STEL: 15 ppm
Naphthalene :	
Guideline ACGIH:	Skin: Yes. TLV-STEL: 15 ppm TLV-TWA: 10 ppm
Guideline OSHA:	PEL-TWA: 10 ppm
Note:	Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.
	State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

SECTION 9 : PHYSICAL and CHEMICAL PROPERTIES

Physical State:	Liquid.
Color:	Ambert to Black
Odor:	Petroleum. Rotten egg / sulfurous
Odor Threshold:	Not determined.
Boiling Point:	70 to 110 °F (21 to 43 °C)
Melting Point:	Not determined.
Density:	5.83-8.58 lbs/gal Bulk
Specific Gravity:	0.7-1.03 @ 60°F (15.6°C) Reference water = 1
Solubility:	Negligible solubility in water.
Vapor Density:	>1 (air = 1)
Vapor Pressure:	8.5-15 psia (Reid VP) @ 100°F (37.8°C)
Percent Volatile:	Not determined.
Evaporation Rate:	Not determined.
pH:	Not applicable.
Viscosity:	Not determined.
Coefficient of Water/Oil Distribution:	Not determined.
Flash Point:	<-20°F (<-29°C)
Flash Point Method:	Manual ASTM D53
Auto Ignition Temperature:	Not determined.
Note:	Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

SECTION 10 : STABILITY and REACTIVITY

Chemical Stability:	Stable under normal ambient and anticipated conditions of use.
Hazardous Polymerization:	Hazardous Polymerization does not occur.
Conditions to Avoid:	Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.
Incompatible Materials:	Avoid contact with strong oxidizing agents and strong reducing agents.
Special Decomposition Products:	Thermal decomposition or combustion may liberate carbon oxides, aldehydes, and other toxic gases or vapors

SECTION 11 : TOXICOLOGICAL INFORMATION

Crude Oil (Petroleum) :

Eye:	Administration into the eye - Rabbit Standard Draize test : 100 mg [Mild] (RTECS)
Skin:	Administration onto the skin - Rabbit LD50 - Lethal dose, 50 percent kill : >2000 mg/kg [Details of toxic effects not reported other than lethal dose value] (RTECS)
Ingestion:	Oral - Rat LD50 - Lethal dose, 50 percent kill : >4300 mg/kg [Details of toxic effects not reported other than lethal dose value] Oral - Rat LD50 - Lethal dose, 50 percent kill : >5000 mg/kg [Gastrointestinal - Hypermotility, diarrhea] (RTECS)
Carcinogenicity:	May cause cancer Chronic application of crude oil to mouse skin resulted in an increased incidence of skin tumors. IARC concluded in its Crude Oil Monograph that there is limited evidence of

	carcinogenicity in animals, and that crude oil is not classifiable as to its carcinogenicity in humans (Group 3). It has not been listed as a carcinogen by NTP or OSHA.
Mutagenicity:	Inadequate information available.
Reproductive Toxicity:	Inadequate information available. Dermal exposure to crude oil during pregnancy resulted in limited evidence of developmental toxicity in laboratory animals. Decreased fetal weight and increased resorptions were noted at maternally toxic doses. No significant effects on pup growth or other developmental landmarks were observed postnatally.
Other Toxicological Information:	
N-Hexane :	
Eye:	Administration into the eye - Rabbit Standard Draize test : 10 mg [Mild] (RTECS)
Inhalation:	Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 48000 ppm/4H [Details of toxic effects not reported other than lethal dose value] Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 627000 mg/m ³ /3M [Details of toxic effects not reported other than lethal dose value] (RTECS)
Ingestion:	Oral - Rat LD50 - Lethal dose, 50 percent kill : 15840 mg/kg [Details of toxic effects not reported other than lethal dose value] Oral - Rat LD50 - Lethal dose, 50 percent kill : 29700 mg/kg [Behavioral - Somnolence (general depressed activity) Gastrointestinal - Changes in structure or function of salivary glands Gastrointestinal - Hypermotility, diarrhea] (RTECS)
Reproductive Toxicity:	Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.
Neurological Effects:	Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone.
Ethyl Benzene :	
Eye:	Administration into the eye - Rabbit Standard Draize test : 500 mg [Severe] (RTECS)
Skin:	Administration onto the skin - Rabbit LD50 - Lethal dose, 50 percent kill : 17800 uL/kg [Details of toxic effects not reported other than lethal dose value] Administration onto the skin - Rabbit LD50 - Lethal dose, 50 percent kill : >5000 mg/kg [Details of toxic effects not reported other than lethal dose value] (RTECS)
Inhalation:	Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 55000 mg/m ³ /2H [Details of toxic effects not reported other than lethal dose value] (RTECS) In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.
Ingestion:	Oral - Rat LD50 - Lethal dose, 50 percent kill : 3500 mg/kg [Liver - Other changes Kidney/Ureter/Bladder - Other changes] Oral - Rat LD50 - Lethal dose, 50 percent kill : 3500 mg/kg [Details of toxic effects not reported other than lethal dose value] (RTECS)
Carcinogenicity:	Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.
Xylenes :	
Eye:	Administration into the eye - Rabbit Standard Draize test : 87 mg [Mild] Administration into the eye - Rabbit Standard Draize test : 5 mg/24H [Severe] (RTECS)
Skin:	Administration onto the skin - Rabbit LD50 - Lethal dose, 50 percent kill : >1700 mg/kg [Details of toxic effects not reported other than lethal dose value] (RTECS)
Inhalation:	Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 5000 ppm/4H [Details of toxic effects not reported other than lethal dose value] (RTECS)
Ingestion:	Oral - Rat LD50 - Lethal dose, 50 percent kill : 4300 mg/kg [Liver - Other changes Kidney/Ureter/Bladder - Other changes] (RTECS)
Reproductive Toxicity:	Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions, but no evidence of teratogenicity.
Other Toxicological Information:	Rats exposed to xylenes at 800, 1000 or 1200 ppm 14 hours daily for 6 weeks demonstrated high frequency hearing loss. Another study in rats exposed to 1800 ppm 8 hours daily for 5 days demonstrated middle frequency hearing loss.
Benzene :	
Eye:	Administration into the eye - Rabbit Standard Draize test : 88 mg [Moderate] Administration into the eye - Rabbit Standard Draize test : 2 mg/24H [Severe] (RTECS)
Skin:	Administration onto the skin - Rabbit LD50 - Lethal dose, 50 percent kill : >9400 uL/kg [Details of toxic effects not reported other than lethal dose value] (RTECS)
Inhalation:	Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 10000 ppm/7H [Details of toxic effects not reported other than lethal dose value] (RTECS)
Ingestion:	Oral - Rat LD50 - Lethal dose, 50 percent kill : 930 mg/kg [Behavioral - Tremor Behavioral - Convulsions or effect on seizure threshold] Oral - Rat LD50 - Lethal dose, 50 percent kill : 1 mL/kg [Details of toxic effects not reported other than lethal dose value] Oral - Rat LD50 - Lethal dose, 50 percent kill : 1800 mg/kg [Details of toxic effects not reported other than lethal dose value] Oral - Rat LD50 - Lethal dose, 50 percent kill : 6400 mg/kg [Peripheral Nerve and Sensation - Recording from peripheral motor nerve Blood - Changes in other cell count (unspecified) Blood - Changes in leukocyte (WBC) count] (RTECS)
Carcinogenicity:	Benzene is an animal carcinogen and is known to produce acute myelogenous leukemia (a form of cancer) in humans. Benzene has been identified as a human carcinogen by IARC, the US National Toxicology Program and the US-Occupational Safety and Health Administration.

Mutagenicity:	Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells. Exposure has also been associated with chromosomal aberrations in sperm cells in human and animal studies.
Reproductive Toxicity:	Some studies in occupationally exposed women have suggested benzene exposure increased risk of miscarriage and stillbirth and decreased birth weight and gestational age. The size of the effects detected in these studies was small, and ascertainment of exposure and outcome in some cases relied on self-reports, which may limit the reliability of these results.
Other Toxicological Information:	Prolonged or repeated exposures to benzene vapors can cause damage to the blood and blood forming organs, including disorders like leukopenia, thrombocytopenia, and aplastic anemia.
Hydrogen Sulfide :	
Inhalation:	<p>Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 444 ppm [Lungs, Thorax, or Respiration - Other changes Gastrointestinal - Hypermotility, diarrhea Kidney/Ureter/Bladder - Urine volume increased]</p> <p>Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 820 mg/m³/3H [Details of toxic effects not reported other than lethal dose value]</p> <p>Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 700 mg/m³/4H [Details of toxic effects not reported other than lethal dose value]</p> <p>Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 470 mg/m³/6H [Details of toxic effects not reported other than lethal dose value]</p> <p>Inhalation - Rat LC50 - Lethal concentration, 50 percent kill : 444 ppm/4H [Details of toxic effects not reported other than lethal dose value] (RTECS)</p>
Naphthalene :	
Skin:	<p>Administration onto the skin - Rat LD50 - Lethal dose, 50 percent kill : >2500 mg/kg [Details of toxic effects not reported other than lethal dose value]</p> <p>Administration onto the skin - Rabbit LD50 - Lethal dose, 50 percent kill : >20 gm/kg [Details of toxic effects not reported other than lethal dose value] (RTECS)</p>
Ingestion:	Oral - Rat LD50 - Lethal dose, 50 percent kill : 490 mg/kg [Details of toxic effects not reported other than lethal dose value] (RTECS)
Carcinogenicity:	Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The US National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial ne uroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has been identified as a carcinogen by IARC and NTP.

SECTION 12 : ECOLOGICAL INFORMATION

Ecotoxicity:	Experimental studies of acute aquatic toxicity show values for crude oil in the range of 2 to over 100 mg/L. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions. Crude oil should be regarded as harmful to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment. Classification: H411; Chronic Cat 2.
Environmental Fate:	Persistence per IOPC Fund definition: Persistent
Bioaccumulation:	Log Kow values measured for the hydrocarbon components of this material range from less than 2 to greater than 6, and therefore would be regarded as having the potential to bioaccumulate.
Biodegradation:	Most crude oils are not regarded as readily biodegradable. Most of the non-volatile constituents are inherently biodegradable; some of the highest molecular weight components are persistent in water.
Mobility In Environmental Media:	Crude oil spreads as a film on the surface of water, facilitating loss of its lighter components by volatilization. In air, the volatile hydrocarbons undergo photodegradation by reaction with hydroxyl radicals with half-lives varying from 0.5 days for n-dodecane to 6.5 days for benzene. The lower molecular weight aromatic hydrocarbons and some polar compounds have low but significant water solubility. Some higher molecular weight compounds are removed by emulsification and these also slowly biodegrade; others adsorb to sediment and sink. A further removal process from water involving the heavier fraction is agglomeration to form tars, some of which sink.

SECTION 13 : DISPOSAL CONSIDERATIONS

Waste Disposal:	<p>Consult with the US EPA Guidelines listed in 40 CFR Part 261.3 for the classifications of hazardous waste prior to disposal. Furthermore, consult with your state and local waste requirements or guidelines, if applicable, to ensure compliance. Arrange disposal in accordance to the EPA and/or state and local guidelines.</p> <p>The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.</p> <p>This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.</p> <p>Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.</p>
RCRA Number:	EPA Waste Number(s) • D001 - Ignitability characteristic • D018 - Toxicity characteristic (Benzene)

SECTION 14 : TRANSPORT INFORMATION

DOT Shipping Name:	Petroleum crude oil
DOT UN Number:	UN1267
DOT Hazard Class:	3
DOT Packing Group:	I
IATA Shipping Name:	Petroleum crude oil

IATA UN Number:	UN1267
IATA Hazard Class:	3
IATA Packing Group:	I
IMDG UN Number :	UN1267
IMDG Shipping Name :	Petroleum crude oil
IMDG Hazard Class :	3
IMDG Packing Group :	I
Notes :	U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25. If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I.

SECTION 15 : REGULATORY INFORMATION

Section 311/312 Hazard Categories:	Acute Health: Yes Chronic Health: Yes Fire Hazard: Yes Pressure Hazard: No Reactive Hazard: No
California PROP 65:	This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5): Various Polycyclic Aromatic Hydrocarbons: Skin Cancer Toluene: Developmental Toxicant, Female Reproductive Toxicant
Canada WHMIS:	WHMIS Hazard Class: B2 - Flammable Liquids D2A, D2B
Crude Oil (Petroleum) :	
TSCA Inventory Status:	Listed
Canada DSL:	Listed
N-Hexane :	
TSCA Inventory Status:	Listed
Section 313:	EPCRA - 40 CFR Part 372 - (SARA Title III) Section 313 Listed Chemical.: 1.0% de minimis
Canada DSL:	Listed
Ethyl Benzene :	
TSCA Inventory Status:	Listed
Section 313:	EPCRA - 40 CFR Part 372 - (SARA Title III) Section 313 Listed Chemical.: 0.1% de minimis
California PROP 65:	Listed: cancer.
Canada DSL:	Listed
Xylenes :	
TSCA Inventory Status:	Listed
Section 313:	EPCRA - 40 CFR Part 372 - (SARA Title III) Section 313 Listed Chemical.: 1.0% de minimis
Canada DSL:	Listed
Benzene :	
TSCA Inventory Status:	Listed
Section 313:	EPCRA - 40 CFR Part 372 - (SARA Title III) Section 313 Listed Chemical.: 0.1% de minimis
California PROP 65:	Listed: developmental.
Canada DSL:	Listed
Hydrogen Sulfide :	
TSCA Inventory Status:	Listed
Section 302 EHS:	TPQ 500 lb
Section 304 RQ:	100 lb
Canada DSL:	Listed
Naphthalene :	
TSCA Inventory Status:	Listed
Section 313:	EPCRA - 40 CFR Part 372 - (SARA Title III) Section 313 Listed Chemical.: 0.1% de minimis
California PROP 65:	Listed: cancer.
Canada DSL:	Listed

SECTION 16 : ADDITIONAL INFORMATION

HMIS Health Hazard:	2*
HMIS Fire Hazard:	3
HMIS Reactivity:	1

HMIS Personal Protection:

X

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists;
CASRN = Chemical Abstracts Service Registry Number;
CEILING = Ceiling Limit (15 minutes);
CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act;
EPA = Environmental Protection Agency;
GHS = Globally Harmonized System;
IARC = International Agency for Research on Cancer;
INSHT = National Institute for Health and Safety at Work;
IOPC = International Oil Pollution Compensation;
LEL = Lower Explosive Limit;
NE = Not Established;
NFPA = National Fire Protection Association;
NTP = National Toxicology Program;
OSHA = Occupational Safety and Health Administration;
PEL = Permissible Exposure Limit (OSHA);
SARA = Superfund Amendments and Reauthorization Act;
STEL = Short Term Exposure Limit (15 minutes);
TLV = Threshold Limit Value (ACGIH);
TWA = Time Weighted Average (8 hours);
UEL = Upper Explosive Limit;
WHMIS = Work e r Hazardous Materials Information System (Canada)

Disclaimer:

The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.



Safety Data Sheet

Section 1: Identification

Product identifier

Product Name . Natural Gas
Synonyms . Natural gas-dry; Pipeline gas
SDS Number/Grade . NG 2008-01

Relevant identified uses of the substance or mixture and uses advised against

Recommended use . Residential, commercial and industrial heating, industrial feedstock, power generation and vehicle transportation

Details of the supplier of the safety data sheet

Manufacturer Cunningham Energy, LLC
3230 Pennsylvania Ave
Charleston, WV 25302
(304) 344-9291

Emergency telephone number

Manufacturer Steve Rhodes
(843) 446-9698

Section 2: Hazard Identification

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 . Flammable Gases 1 - H220
Compressed Gas - H280
Simple Asphyxiant

Label elements

OSHA HCS 2012

DANGER



Hazard statements . Extremely flammable gas - H220
Contains gas under pressure; may explode if heated - H280
May displace oxygen and cause rapid suffocation.

Precautionary statements

Prevention . Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking. - P210

Response . Leaking gas fire: Do not extinguish, unless leak can be stopped safely. - P377
Eliminate all ignition sources if safe to do so. - P381

Storage/Disposal . Protect from sunlight. Store in a well-ventilated place. - P410+P403

Other hazards

OSHA HCS 2012

. Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Section 3 - Composition/Information on Ingredients

Substances

. Material does not meet the criteria of a substance.

Mixtures

Composition				
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive
Methane	CAS:74-82-8	93.5%	NDA	OSHA HCS 2012: Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.
Ethane	CAS:74-84-0	3.8%	NDA	OSHA HCS 2012: Flam. Gas 1; Press. Gas - Comp., Simp. Asphyx.
Nitrogen	CAS:7727-37-9	1.2%	NDA	OSHA HCS 2012: Press. Gas - Comp.; Simp. Asphyx.
Propane	CAS:74-98-6	1%	NDA	OSHA HCS 2012: Flam. Gas 1; Press. Gas - Comp., Simp. Asphyx.
Carbon dioxide	CAS:124-38-9	0.3%	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	OSHA HCS 2012: Press. Gas - Comp.; Simp. Asphyx.
Isobutane	CAS:75-28-5	0.1%	Inhalation-Rat LC50 • 658000 mg/m ³ 4 Hour(s)	OSHA HCS 2012: Flam. Gas 1; Press Gas - Comp.; Simp. Asphyx.
Butane	CAS:106-97-8	0.1%	Inhalation-Rat LC50 • 658 g/m ³ 4 Hour(s)	OSHA HCS 2012: Flam. Gas 1; Press Gas - Comp.; Simp. Asphyx.
Pentane	CAS:109-66-0	< 0.1%	Inhalation-Rat LC50 • 364 g/m ³ 4 Hour(s)	OSHA HCS 2012: Exposure limit(s)
Hexane	CAS:110-54-3	< 0.1%	Inhalation-Rat LC50 • 627000 mg/m ³ 3 Minute(s)	OSHA HCS 2012: Exposure limit(s)
2-Methylbutane (In Liquid form)	CAS:78-78-4	< 0.1%	Inhalation-Rat LC50 • 280000 mg/m ³ 4 Hour(s)	OSHA HCS 2012: Exposure limit(s)
2-Propanethiol, 2-methyl-	CAS:75-66-1	< 30ppm	Ingestion/Oral-Rat LD50 • 4729 mg/kg Inhalation-Rat LC50 • 22200 ppm 4 Hour(s)	OSHA HCS 2012: Exposure limit(s)
Methyl ethyl sulfide	CAS:624-89-5	< 8ppm	NDA	OSHA HCS 2012: Exposure limit(s)
Hydrogen sulfide	CAS:7783-06-4	< 5ppm	Inhalation-Rat LC50 • 700 mg/m ³ 4 Hour(s)	OSHA HCS 2012: Exposure limit(s)

All percentages provided are approximate.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation

- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin

- Although exposure is unlikely, in case of contact immediately flush skin with running water. If skin irritation develops get medical advice/attention.

Eye

- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. If irritation develops and persists, get medical attention.

Ingestion

- Ingestion is not considered a potential route of exposure.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. A potential health hazard associated with this gas is anoxia.

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media • Dry Chemical, (Potassium Bicarbonate based *Purple K* most effective), Carbon dioxide, Water.

Unsuitable Extinguishing Media

- No data available

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards

- EXTREMELY FLAMMABLE
Will form explosive mixtures with air.
Vapors may travel to source of ignition and flash back.
Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
Containers may explode when heated.
Ruptured cylinders may rocket.

Hazardous Combustion Products

- No data available

Advice for firefighters

- Gas fires should not be extinguished unless flow of gas can be stopped.
Only authorized personnel should turn off valves or attempt repairs.
Fire crews should wear self-contained breathing apparatus (SCBA).
Natural gas is lighter than air and will vent upward but special consideration should be given to areas that may trap or contain explosive concentrations including areas of potential migration underground or through structures.
Water mist may be used to cool surrounding structures including compressed gas cylinders or tanks.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions

- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Do not touch or walk through spilled material. Ventilate the area before entry.

Emergency Procedures

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Stop leak if you can do it without risk. Keep unauthorized personnel away. Keep out of low areas. Stay upwind. LARGE SPILL:

Consider initial downwind evacuation for at least 800 meters (1/2 mile)

Environmental precautions

- Prevent spreading of vapors through sewers, ventilation systems and confined areas.

Methods and material for containment and cleaning up

Containment/Clean-up Measures

- All equipment used when handling the product must be grounded.
Stop leak if you can do it without risk.
If possible, turn leaking containers so that gas escapes rather than liquid.
Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
Do not direct water at spill or source of leak.
Isolate area until gas has dispersed.

Section 7 - Handling and Storage

Precautions for safe handling

Handling

- Keep away from heat and ignition sources – No Smoking. Take precautionary measures against static charges. All equipment used when handling the product must be grounded. Use only non-sparking tools. Use only with adequate ventilation. Ventilate closed spaces before entering. Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Cylinders should be firmly secured to prevent falling or being knocked-over. Use explosion-proof - electrical, ventilating and/or lighting equipment. Do not attempt to repair, adjust, or in any other way modify cylinders. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Empty containers retain product residue and can be hazardous. Do not cut, weld, puncture or incinerate container.

Conditions for safe storage, including any incompatibilities

Storage

- Store in a cool/low-temperature, well-ventilated dry place away from heat and ignition sources. Protect cylinders against physical damage. Cylinders should be firmly secured to prevent falling or being knocked-over.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Pentane (109-66-0)	TWAs	600 ppm TWA (listed under Pentane, all isomers)	120 ppm TWA; 350 mg/m ³ TWA	1000 ppm TWA; 2950 mg/m ³ TWA
	Ceilings	Not established	610 ppm Ceiling (15 min); 1800 mg/m ³ Ceiling (15 min)	Not established
Hexane (110-54-3)	TWAs	50 ppm TWA	50 ppm TWA; 180 mg/m ³ TWA	500 ppm TWA; 1800 mg/m ³ TWA
Isobutane (75-28-5)	STELs	1000 ppm STEL	Not established	Not established
	TWAs	Not established	800 ppm TWA; 1900 mg/m ³ TWA	Not established
Butane (106-97-8)	STELs	1000 ppm STEL	Not established	Not established
	TWAs	Not established	800 ppm TWA; 1900 mg/m ³ TWA	Not established
2-Methylbutane (In Liquid form) (78-78-4)	TWAs	600 ppm TWA (listed under Pentane, all isomers)	Not established	Not established
	TWAs	5000 ppm TWA	5000 ppm TWA; 9000 mg/m ³ TWA	5000 ppm TWA; 9000 mg/m ³ TWA

Carbon dioxide

(124-38-9)	STELs	30000 ppm STEL	30000 ppm STEL; 54000 mg/m3 STEL	Not established
Propane (74-98-6)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	1000 ppm TWA; 1800 mg/m3 TWA	1000 ppm TWA; 1800 mg/m3 TWA
Ethane (74-84-0)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	Not established	Not established
Hydrogen sulfide (7783-06-4)	Ceilings	Not established	10 ppm Ceiling (10 min); 15 mg/m3 Ceiling (10 min)	20 ppm Ceiling
	STELs	5 ppm STEL	Not established	Not established
	TWAs	1 ppm TWA	Not established	Not established
Methane (74-82-8)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	Not established	Not established

Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof - electrical, ventilating and/or lighting equipment.

Personal Protective Equipment

Respiratory

- In case of insufficient ventilation, wear suitable respiratory equipment. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Wear safety glasses.

Skin/Body

- Wear leather gloves when handling cylinders.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description

Physical Form	Gas	Appearance/Description	Colorless, tasteless gas that has no odor or if trace amounts of sulfur compounds are added as an odorant the gas has a garlic/rotten-egg/skunk odor.
Color	Colorless	Odor	Odorless or with trace amounts of sulfur compounds added as an odorant resulting in a garlic/rotten-egg/skunk odor.
Odor Threshold	No data available		

General Properties

Boiling Point	-258.7 F(-161.5 C) at 14.73 psig	Melting Point	No data available
Decomposition Temperature	No data available	pH	No data available
Specific Gravity/Relative Density	0.55 to 0.64 Water=1 depending on composition	Density	0.044 lb(s)/ft³
Bulk Density	No data available	Water Solubility	Slightly Soluble 0.1 to 1 %
Viscosity	No data available		
Volatility			
Vapor Pressure	No data available	Vapor Density	No data available
Evaporation Rate	No data available		
Flammability			
Flash Point	-306 F(-187.7778 C)	UEL	15 % Limits vary slightly with composition
LEL	4.8 % Limits vary slightly with composition	Autoignition	1004 F(540 C)
Flammability (solid, gas)	Flammable gas.		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable under normal temperatures and pressures.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Keep away from heat, sparks, and flame.

Incompatible materials

- Strong oxidizers.

Hazardous decomposition products

- Oxides of carbon (CO, CO2), "soot"

Section 11 - Toxicological Information

Information on toxicological effects

Components		
Methane (93.5%)	74-82-8	Acute Toxicity: Inhalation-Mouse LC50 • 326 g/m³ 2 Hour(s)
Isobutane (0.1%)	75-28-5	Acute Toxicity: Inhalation-Rat LC50 • 57 pph 15 Minute(s); Behavioral:Tremor; Behavioral:Convulsions or effect on seizure threshold; Lungs, Thorax, or Respiration:Respiratory depression
Butane (0.1%)	106-97-8	Acute Toxicity: Inhalation-Rat LC50 • 658 g/m³ 4 Hour(s)

2-Methylbutane (In Liquid form) (< 0.1%)	78-78-4	Acute Toxicity: Inhalation-Rat LC50 • 280000 mg/m³ 4 Hour(s)
Pentane (< 0.1%)	109-66-0	Acute Toxicity: Ingestion/Oral-Rat LD50 • >2000 mg/kg
Hexane (< 0.1%)	110-54-3	Acute Toxicity: Ingestion/Oral-Rat LD50 • 25 g/kg; Inhalation-Rat LC50 • 48000 ppm 4 Hour(s); Irritation: Eye-Rabbit • 10 mg • Mild irritation
Carbon dioxide (0.3%)	124-38-9	Acute Toxicity: Inhalation-Rat LC50 • 470000 ppm 30 Minute(s); Reproductive: Inhalation-Rat TClO • 6 pph 24 Hour(s)(10D preg); <i>Reproductive Effects: Specific Developmental Abnormalities: Musculoskeletal system</i> ; <i>Reproductive Effects: Specific Developmental Abnormalities: Cardiovascular (circulatory) system</i> ; <i>Reproductive Effects: Specific Developmental Abnormalities: Respiratory system</i>

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • No data available
Aspiration Hazard	OSHA HCS 2012 • No data available
Carcinogenicity	OSHA HCS 2012 • No data available
Germ Cell Mutagenicity	OSHA HCS 2012 • No data available
Skin corrosion/Irritation	OSHA HCS 2012 • No data available
Skin sensitization	OSHA HCS 2012 • No data available
STOT-RE	OSHA HCS 2012 • No data available
STOT-SE	OSHA HCS 2012 • No data available
Toxicity for Reproduction	OSHA HCS 2012 • No data available
Respiratory sensitization	OSHA HCS 2012 • No data available
Serious eye damage/Irritation	OSHA HCS 2012 • No data available

Route(s) of entry/exposure . Inhalation, Skin, Eye, Ingestion

Potential Health Effects

Inhalation

Acute (Immediate)

- . If this material is released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with decreased levels of oxygen: increase in breathing and pulse rate, emotional upset, abnormal fatigue, nausea, vomiting, collapse, loss of consciousness, convulsive movements, respiratory collapse and death.

Chronic (Delayed)

- . No data available

Skin

Acute (Immediate)

- . Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- . Under normal conditions of use, no health effects are expected.

Eye

Acute (Immediate)

- . Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- . Under normal conditions of use, no health effects are expected.

Ingestion

Acute (Immediate)

- . Ingestion is not anticipated to be a likely route of exposure to this product.

Chronic (Delayed)

- . Ingestion is not anticipated to be a likely route of exposure to this product.

Key to abbreviations

LD = Lethal Dose

MLD = Mild

TC = Toxic Concentration

Section 12 - Ecological Information**Toxicity**

- Material data lacking.

Persistence and degradability

- Material data lacking.

Bioaccumulative potential

- Material data lacking.

Mobility in Soil

- Material data lacking.

Results of PBT and vPvB assessment

- PBT and vPvB assessment has not been conducted for this material.

Other adverse effects

- No studies have been found.

Section 13 - Disposal Considerations**Waste treatment methods****Product waste**

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN1971	Methane, compressed or Natural gas, compressed (with high methane content)	2.1	NDA	NDA

Special precautions for user

- Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- Not relevant.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture
SARA Hazard Classifications . Acute, Fire, Pressure(Sudden Release of)

Inventory		
Component	CAS	TSCA
2-Methylbutane (In Liquid form)	78-78-4	Yes
2-Propanethiol, 2-methyl-	75-66-1	Yes
Butane	106-97-8	Yes
Carbon dioxide	124-38-9	Yes
Ethane	74-84-0	Yes
Hexane	110-54-3	Yes
Hydrogen sulfide	7783-06-4	Yes
Isobutane	75-28-5	Yes
Methane	74-82-8	Yes
Methyl ethyl sulfide	624-89-5	Yes
Nitrogen	7727-37-9	Yes
Pentane	109-66-0	Yes
Propane	74-98-6	Yes

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Hydrogen sulfide	7783-06-4	1500 lb TQ
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methylethylsulfide	624-89-5	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed

• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Hydrogen sulfide	7783-06-4	100 lb final RQ; 45.4 kg final RQ
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	5000 lb final RQ; 2270 kg final RQ
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Hydrogen sulfide	7783-06-4	100 lb EPCRA RQ
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• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyllethylsulfide	624-89-5	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Hydrogen sulfide	7783-06-4	500 lb TPQ
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyllethylsulfide	624-89-5	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Hydrogen sulfide	7783-06-4	1.0 % de minimis concentration
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	1.0 % de minimis concentration
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyllethylsulfide	624-89-5	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed

• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Hydrogen sulfide	7783-06-4	Not Listed
• Pentane	109-66-0	Not Listed
• Ethane	74-84-0	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	Not Listed
• Isobutane	75-28-5	Not Listed
• Carbon dioxide	124-38-9	Not Listed
• Propane	74-98-6	Not Listed
• Butane	106-97-8	Not Listed
• Hexane	110-54-3	Not Listed
• Nitrogen	7727-37-9	Not Listed
• Methane	74-82-8	Not Listed
• 2-Propanethiol, 2-methyl-	75-66-1	Not Listed
• Methyl ethyl sulfide	624-89-5	Not Listed

Section 16 - Other Information

Disclaimer/Statement of Liability

- The data contained in this SDS are believed to be accurate, but are not so warranted whether or not they originated at NW Natural. Recipients of this SDS are advised to confirm ahead of time that the data are current and suitable to their needs.

Key to abbreviations

NDA = No Data Available

MATERIAL SAFETY DATA SHEET



1. Product and Company Identification

Material name	Produced water (sweet)
Version #	01
Revision date	04-27-2010
CAS #	Mixture
Synonym(s)	Crude Oil Separated Water, Salt Water Brine, Salt Water, Formation Water
Manufacturer/Supplier	Cunningham Energy, LLC 3230 Pennsylvania Avenue Charleston, WV 25302 Telephone: (304) 344-9291 -
Emergency	Steve Rhodes (843) 446-9698

2. Hazards Identification

Physical state	Liquid.
Appearance	Dirty colored liquid with a faint hydrocarbon odor.
Emergency overview	WARNING! Causes eye irritation. This product may contain a small amount of hydrocarbons with a trace amount of benzene which may cause cancer and heritable genetic damage.
OSHA regulatory status	This preparation is not classified as dangerous according to Directive 1999/45/EC and its amendments. This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Routes of exposure	Eye contact. Skin contact. Ingestion. Inhalation.
Eyes	Causes eye irritation.
Skin	Prolonged or repeated skin contact may cause irritation. Human and animal studies show that benzene is absorbed through the skin. However, absorption through the skin is normally low because benzene evaporates rapidly. In most cases, any skin contact would also involve significant inhalation exposure.
Inhalation	No inhalation hazard under normal conditions. If misting occurs: may cause mild mucous membrane irritation of the nose, throat, and upper respiratory tract. Produced water may contain benzene which may cause cancer and cause blood disorders.
Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. The product may contain benzene which may cause cancer and cause blood disorders
Chronic effects	Contains benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans has not been fully established.
Potential environmental effects	Not expected to be harmful to aquatic organisms.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Water	7732-18-5	80-95
Calcium chloride	10043-52-4	0-20
Potassium Chloride	7447-40-7	0-20

Sodium chloride	7647-14-5	0-20
Benzene	71-43-2	<0.1

Composition comments May contain small amounts of condensate or crude oil as a contaminate. All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures

Eye contact	In case of contact, immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Get medical attention if irritation persists.
Skin contact	Remove contaminated clothing and shoes. Wash affected area with mild soap and water. Get medical attention if irritation develops and persists.
Inhalation	If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.
Ingestion	Rinse mouth thoroughly. Get medical attention if any discomfort occurs.
General advice	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties	This product is not flammable; however sufficient hydrocarbon vapors may accumulate from oil or natural gas condensate floating on the surface of the produced water to cause a flash fire. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water.
Extinguishing media	
Suitable extinguishing media	Dry chemical powder. Foam. Carbon dioxide (CO2).
Protection of firefighters	
Protective equipment and precautions for firefighters	A fire would be associated with vapors related to oil or natural gas condensate floating on the surface of the produced water. Water maybe ineffective on flames and may even spread the fire but should be used to cool pressurized containers in the fire.
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.
Specific methods	Promptly isolate the scene by removing persons from the vicinity of the incident if there is a fire. Do not extinguish flames at leak because of the possibility of a uncontrolled re-ignition exists. If it is safe to do so, cut off fuel supply and/or allow fire to burn out. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water. If leak or spill has not ignited, water spray or ventilation can be used to disperse the vapors.
Hazardous combustion products	Sodium oxides. Carbon oxides.

6. Accidental Release Measures

Personal precautions	Keep away from sources of ignition - No smoking. The vapors should dissipate fairly rapidly depend on the amount of oil and natural gas condensate floating on the surface of the produced water. Stay upwind. Keep unnecessary personnel away. See Section 8 of the MSDS for Personal Protective Equipment.
Environmental precautions	Prevent further leakage or spillage if safe to do so. Do not allow to enter drains, sewers or watercourses.
Methods for containment	Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.
Methods for cleaning up	Recover by pumping (use an explosion-proof motor or hand pump) or by sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Where feasible and appropriate, remove contaminated soil or flush with fresh water. On water spills utilize absorbent material to remove oil and natural gas liquid from the surface of the water.
Other information	Avoid excess skin contact with spilled material.

7. Handling and Storage

Handling

Handle as a flammable liquid. Tank headspaces should always be regarded as potentially flammable and care should be taken to avoid static electrical discharge and all ignition sources during filling, discharging and sampling from storage tanks. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion. Keep away from heat, sparks, and open flame. Electrical equipment should be approved for classified area. Wear appropriate personal protective equipment (see section 8). Special precautions should be taken when entering or handling equipment in this type of produced water service because of possible radioactive contamination. All equipment should be checked for radioactivity or opened to the atmosphere and have forced ventilation applied for at least 4 hours prior to entry or handling. Avoid direct skin contact with any surface. Avoid generation of dust, smoke, fumes, etc. in the work area, or if they cannot be avoided, a tested and certified radionuclide dust respirator should be worn. Smoking, eating or drinking should be prohibited when working with the equipment. Workers should wash thoroughly with soap and water and discard contaminated clothing after entering or handling the equipment. Workers should wash hands and face before eating, drinking and smoking.

Storage

Keep containers in well-ventilated area away from flame, sparks, excessive temperatures and open flames. Keep the containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Do not enter storage areas and confined spaces without adequate ventilation. Use appropriate respiratory protection if there is the potential to exceed the exposure limit(s). Vapors containing benzene may accumulate during storage and transport.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components

	Type	Value
Benzene (71-43-2)	STEL	2.5 ppm
	TWA	0.5 ppm

U.S. – OSHA

Components

	Type	Value
Benzene (71-43-2)	Ceiling	25 ppm
	STEL	5 ppm
	TWA	1 ppm

Canada – Alberta

Components

	Type	Value
Benzene (71-43-2)	STEL	8 mg/m3
		2.5 ppm
	TWA	1.6 mg/m3
		0.5 ppm

Canada - British Columbia

Components

	Type	Value
Benzene (71-43-2)	STEL	2.5 ppm
	TWA	0.5 ppm

Canada – Ontario

Components

	Type	Value
Benzene (71-43-2)	STEL	2.5 ppm
	TWA	0.5 ppm
Calcium chloride (10043-52-4)	TWA	5 mg/m3

Canada – Quebec

Components

	Type	Value
Benzene (71-43-2)	STEL	15.5 mg/m3
		5 ppm
	TWA	3 mg/m3
		1 ppm

Engineering controls

Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye / face protection

If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.

Skin protection

No special garments required. Wash contaminated clothing prior to reuse. Avoid unnecessary skin contamination with material. Use of chemical resistant gloves is advised to prevent skin contact.

Respiratory protection

No personal respiratory protective equipment normally required.

General hygiene considerations

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Handle in accordance with good industrial hygiene and safety practice.

9. Physical & Chemical Properties

Appearance	Dirty colored liquid with a faint hydrocarbon odor.
Color	Varies from clear to dark brown.
Odor	Faint. Hydrocarbon-like.
Odor threshold	Not available.
Physical state	Liquid.
Form	Liquid.
pH	4.9 - 8.5
Melting point	Not available.
Freezing point	< 32 °F (< 0 °C)
Boiling point	212 °F (100 °C) Approx.
Flash point	Variable organic oil and dissolved gases are flammable.
Evaporation rate	0.36
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	13.6 mm Hg @ 68°F (20°C)
Vapor density	< 1
Specific gravity	1.1 @ 68°F (20°C)
Solubility (water)	Complete
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	Stable.
Conditions to avoid	Keep away from heat, sparks and open flame.
Hazardous decomposition products	Carbon Dioxide. Water vapor. May produce oxides of sulfur. Incomplete combustion may generate carbon monoxide.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information**Toxicological data****Components**

Calcium chloride (10043-52-4)

Benzene (71-43-2)

Test Results

Acute Oral LD50 Rat: 1000 mg/kg
Acute Other LD50 Mouse: 42 mg/kg
Acute Inhalation LC50 Mouse: 9980 mg/l
Acute Inhalation LC50 Rat: 10000 mg/l 7 Hours
Acute Oral LD50 Mouse: 4700 mg/kg

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Components

Benzene (71-43-2)

Potassium Chloide (7447-40-7)

Test Results

Acute Other LD50 Mouse: 0.000001 ml/kg

Acute Other LD50 Rat: 2.89 mg/kg

Acute Oral LD50 Rat: 2600 mg/kg

Toxicological information

This product may contain detectable but varying quantities of the naturally occurring radioactive substance radon 222. The amount in the gas itself is not hazardous, but since radon rapidly decays ($t_{1/2} = 3.82$ days) to form other radioactive elements including lead 210, polonium 210, and bismuth 210, equipment may be radioactive. The radon daughters are solids and therefore may attach to dust particles or form films and sludges in equipment. Inhalation, ingestion or skin contact with radon daughters can lead to the deposition of radioactive material in the lungs, bone, blood forming organs, intestinal tract, kidney and colon. Occupational exposure to radon and radon daughters has been associated with an increased risk of lung cancer in underground uranium miners. Follow the special precautions listed in handling and storage section of this document (see section 7).

Causes eye irritation. May cause skin irritation. May cause discomfort if swallowed.

Not a skin sensitizer.

No additional adverse health effects noted.

This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

Local effects**Sensitization****Chronic effects****Carcinogenicity****ACGIH Carcinogens**

Benzene (CAS 71-43-2)

A1 Confirmed human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Benzene (CAS 71-43-2)

1 Carcinogenic to humans.

US NTP Report on Carcinogens: Known carcinogen

Benzene (CAS 71-43-2)

Known carcinogen.

US OSHA Specifically Regulated Substances: Cancer hazard

Benzene (CAS 71-43-2)

Cancer hazard.

Epidemiology

No epidemiological data is available for this product.

Mutagenicity

No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Neurological effects

No data available.

Reproductive effects

Contains no ingredient listed as toxic to reproduction

Teratogenicity

No known human teratogenic effect.

Further information

This product has no known adverse effect on human health.

12. Ecological Information**Ecotoxicological data****Components**

Calcium chloride (10043-52-4)

Test Results

EC50 Water flea (Daphnia magna): 52 mg/l 48 hours

LC50 Fathead minnow (Pimephales promelas): 3930 - 5360 mg/l 96 hours

EC50 Water flea (Daphnia magna): 8.76 - 15.6 mg/l 48 hours

EC50 Water flea (Daphnia magna): 8.76 - 15.6 mg/l 48 Hours

LC50 Rainbow trout, donaldson trout (Oncorhynchus mykiss): 5 mg/l 96 Hours

EC50 Water flea (Daphnia magna): 83 mg/l 48 hours

LC50 Western mosquitofish (Gambusia affinis): 435 mg/l 96 hours

EC50 Water flea (Daphnia magna): 340.7 - 469.2 mg/l 48 hours

LC50 American eel (Anguilla rostrata): 0 - 27260 mg/l 96 hours

Ecotoxicity

Not expected to be harmful to aquatic organisms.

Environmental effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Persistence and degradability None known.

Bioaccumulation / Accumulation	No data available.
Partition coefficient (n-octanol/water)	Not available.
Mobility in environmental media	No data available.

13. Disposal Considerations

Disposal instructions	Do not allow this material to drain into sewers/water supplies. This product, in its present state, when discarded or disposed of, is not a hazardous waste according to Federal regulations (40 CFR 261.4 (b)(4)). Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste.
Waste from residues / unused products	Not applicable.

Contaminated packaging

Offer rinsed packaging material to local recycling facilities.

14. Transport Information

DOT	Not regulated as dangerous goods.
IATA	Not regulated as dangerous goods.
IMDG	Not regulated as dangerous goods.
TDG	Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations	This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.
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US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Benzene (CAS 71-43-2)

0.1 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Benzene (CAS 71-43-2)

Listed.

CERCLA (Superfund) reportable quantity (lbs)

Benzene 10

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance

No

Section 311 hazardous chemical

No

Drug Enforcement Agency (DEA)

Not controlled

WHMIS status

Controlled

WHMIS classification

D2B - Other Toxic Effects-TOXIC

WHMIS labeling



State regulations

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Hazardous Substances (Director's): Listed substance
 Benzene (CAS 71-43-2) Listed.
US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
 Benzene (CAS 71-43-2) Listed.
US - California Proposition 65 - CRT: Listed date/Carcinogenic substance
 Benzene (CAS 71-43-2) Listed: February 27, 1987 Carcinogenic.
US - California Proposition 65 - CRT: Listed date/Developmental toxin
 Benzene (CAS 71-43-2) Listed: December 26, 1997 Developmental toxin.
US - California Proposition 65 - CRT: Listed date/Male reproductive toxin
 Benzene (CAS 71-43-2) Listed: December 26, 1997 Male reproductive toxin.
US - Massachusetts RTK - Substance: Listed substance
 Benzene (CAS 71-43-2) Listed.
US - New Jersey Community RTK (EHS Survey): Reportable threshold
 Benzene (CAS 71-43-2) 500 LBS
US - New Jersey RTK - Substances: Listed substance
 Benzene (CAS 71-43-2) Listed.
US - Pennsylvania RTK - Hazardous Substances: Listed substance
 Benzene (CAS 71-43-2) Listed.
US - Pennsylvania RTK - Hazardous Substances: Special hazard
 Benzene (CAS 71-43-2) Special hazard.

16. Other Information

Further information

HMIS® ratings

HMIS® is a registered trade and service mark of the NPCA.

Health: 1

Flammability:

1

Physical hazard: 0

NFPA ratings

Health: 1

Flammability:

1

Instability: 0

Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available.

Attachment I

Attachment I
Emission Units Table
(includes all emission units and air pollution control devices
that will be part of this permit application review, regardless of permitting status)

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
1S	1E	Tank Truck Oil/Condensate Loading Losses (Cochran)	2015	N/A	N/A	N/A
2S	2E	Oil Storage Tank	2015	210 bbls.	New	1C
3S	3E	Oil Storage Tank	2015	210 bbls.	New	1C
4S	4E	Oil Storage Tank	2015	210 bbls.	New	1C
5S	5E	Oil Storage Tank	2015	210 bbls.	New	1C
6S	6E	Oil Storage Tank	2015	210 bbls.	New	1C
7S	7E	Oil Storage Tank	2015	210 bbls.	New	1C
8S	8E	Oil Storage Tank	2015	210 bbls.	New	1C
9S	9E	Oil Storage Tank	2015	210 bbls.	New	1C
10S	10E	Oil Storage Tank	2015	210 bbls.	New	1C
11S	11E	Oil Storage Tank	2015	210 bbls.	New	1C
12S	12E	Oil Storage Tank	2015	210 bbls.	New	1C
13S	13E	Oil Storage Tank	2015	210 bbls.	New	1C
14S	14E	Pneumatic Controllers	2015	210 bbls.	New	1C
1C	1C	Vapor Recovery System	2016	N/A	New	N/A
15S	15E	VRU Natural Gas Compressor Engine	2016	5 osig	New	N/A
16S	16E	Water Storage Tank	2015	101 HP	New	N/A
17S	17E	Water Storage Tank	2015	210 bbls.	New	1C
18S	18E	Water Storage Tank	2015	210 bbls.	New	1C
19S	19E	Water Storage Tank	2015	210 bbls.	New	1C
20S	20E	Water Storage Tank	2015	210 bbls.	New	1C
21S	21E	Water Storage Tank	2015	210 bbls.	New	1C
22S	22E	Water Storage Tank	2015	210 bbls.	New	1C
23S	23E	Water Storage Tank	2015	210 bbls.	New	1C
24S	24E	Water Storage Tank	2015	210 bbls.	New	1C
25S	25E	Water Storage Tank	2015	210 bbls.	New	1C

26S	26E	Water Storage Tank	2015	210 bbls.	New	1C
27S	27E	Water Storage Tank	2015	210 bbls.	New	1C
28S	28E	Tank Truck Water Loading Losses (Cochran)	2015	N/A	N/A	N/A
29S	29E	Back-up Combustor	2016	12.2 MMBTU/HR	New	N/A
30S	30E	Tank Truck Oil/Condensate Loading Losses (King)	2016	N/A	N/A	N/A
31S	31E	Oil Storage Tank	2016	210 bbls	New	1C
32S	32E	Oil Storage Tank	2016	210 bbls	New	1C
33S	33E	Oil Storage Tank	2016	210 bbls	New	1C
34S	34E	Oil Storage Tank	2016	210 bbls	New	1C
35S	35E	Water Storage Tank	2016	210 bbls	New	1C
36S	36E	Water Storage Tank	2016	210 bbls	New	1C
37S	37E	Water Storage Tank	2016	210 bbls	New	1C
38S	38E	Tank Truck Water Loading Losses (King)	2016	N/A	N/A	N/A

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.
² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.
³ New, modification, removal
⁴ For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

Attachment J

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPs)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1E	Upward Vertical Stack	1S	Tank Truck Oil/Condensate Loading Losses (Cochran)	N/A	N/A	C	8760	VOC	23.1174	1.3323	23.1174	1.3323	Gas/Vapor	EE	
								Total HAPs	0.0254	0.0015	0.0254	0.0015			
2E	Upward Vertical Stack	2S	Oil Storage Tank	1C	VRU	C	8760	VOC	0.2845	1.2462	0.2845	1.2462	Gas/Vapor	EE	
								Total HAPs	0.0026	0.0115	0.0026	0.0115			
3E	Upward Vertical Stack	3S	Oil Storage Tank	1C	VRU	C	8760	Toluene	0.0002	0.0009	0.0002	0.0009	Gas/Vapor	EE	
								E-benzene	0.0001	0.0004	0.0001	0.0004			
								Xylene	0.0000	0.0001	0.0000	0.0001			
								n-Hexane	0.0001	0.0003	0.0001	0.0003			
								CO ₂ e	0.0022	0.0099	0.00220	0.00991			
									0.3362	1.4725	0.3362	.4725			
								VOC	0.2845	1.2462	0.2845	1.2462			
								Total HAPs	0.0026	0.0115	0.0026	0.0115			
								Benzene	0.0002	0.0009	0.0002	0.0009			
								Toluene	0.0001	0.0004	0.0001	0.0004			
								E-benzene	0.0000	0.0001	0.0000	0.0001			
								Xylene	0.0001	0.0003	0.0001	0.0003			
								n-Hexane	0.0000	0.0001	0.0000	0.0001			
								CO ₂ e	0.0022	0.0099	0.00220	0.00991			
									0.3362	1.4725	0.3362	.4725			
								VOC	0.2845	1.2462	0.2845	1.2462	Gas/Vapor	EE	
								Total HAPs	0.0026	0.0115	0.0026	0.0115			
								Benzene	0.0002	0.0009	0.0002	0.0009			
								Toluene	0.0001	0.0004	0.0001	0.0004			
								E-benzene	0.0000	0.0001	0.0000	0.0001			
								Xylene	0.0001	0.0003	0.0001	0.0003			
								n-Hexane	0.0000	0.0001	0.0000	0.0001			
								CO ₂ e	0.0022	0.0099	0.00220	0.00991			
									0.3362	1.4725	0.3362	.4725			

4E	Upward Vertical Stack	4S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
5E	Upward Vertical Stack	5S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
6E	Upward Vertical Stack	6S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
7E	Upward Vertical Stack	7S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	

8E	Upward Vertical Stack	8S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
9E	Upward Vertical Stack	9S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
10E	Upward Vertical Stack	10S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
11E	Upward Vertical Stack	11S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	

12E	Upward Vertical Stack	12S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
13E	Upward Vertical Stack	13S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.0022 0.3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.0099 1.4725	0.2845 0.0026 0.0002 0.0001 0.0000 0.0001 0.00220 .3362	1.2462 0.0115 0.0009 0.0004 0.0001 0.0003 0.00991 .4725	Gas/Vapor	EE	
14E	Upward Vertical Stack	14S	Pneumatic Controls	N/A	N/A	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	1.3643 0.0111 0.0008 0.0004 0.0001 0.0002 0.0096 3.5	5.9760 0.0486 0.0034 0.0017 0.0003 0.0009 0.0423 15.33	1.3643 0.0111 0.0008 0.0004 0.0001 0.0002 0.0096 3.5	5.9760 0.0486 0.0034 0.0017 0.0003 0.0009 0.0423 15.33	Gas/Vapor	EE	
15E	Upward Vertical Stack	15S	Vapor Recovery System	N/A	N/A	C	8760	N/A					N/A	N/A	
	Upward Vertical Stack		VRU Natural Gas Compressor or Engine	N/A	N/A	C	8760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	0.982 0.625 0.112 0.000 0.001 0.075 0.067 320.36	4.300 2.737 0.491 0.000 0.004 0.328 0.293 1403.27	0.982 0.625 0.112 0.000 0.001 0.075 0.067 320.36	4.300 2.737 0.491 0.000 0.004 0.328 0.293 1403.27	Gas/Vapor	EE	

16E	Upward Vertical Stack	16S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	
17E	Upward Vertical Stack	17S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	
18E	Upward Vertical Stack	18S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	
19E	Upward Vertical Stack	19S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	

20E	Upward Vertical Stack	20S	Water Storage Tank	1C	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	Gas/Vapor	EE	
21E	Upward Vertical Stack	21S	Water Storage Tank	1C	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	Gas/Vapor	EE	
22E	Upward Vertical Stack	22S	Water Storage Tank	1C	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	Gas/Vapor	EE	
23E	Upward Vertical Stack	23S	Water Storage Tank	1C	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0088	Gas/Vapor	EE	

24E	Upward Vertical Stack	24S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	
25E	Upward Vertical Stack	25S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	
26E	Upward Vertical Stack	26S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	
27E	Upward Vertical Stack	27S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	
28E	Upward Vertical Stack	28S	Tank Truck Water Loading Losses (Cochran)	N/A	N/A	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0017 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	0.0074 0.0000 0.0000 0.0000 0.0000 0.0000 0.0020 0.0088	Gas/Vapor	EE	

29E	Upward Vertical Stack	29S	Back-up Combustor	N/A	N/A	C	8760	NOx CO VOC PM10 Total HAPs CO2e	0.063 0.125 0.343 0.001 0.0032 0.405	0.014 0.027 0.075 0.0000 0.0007 0.0875	0.063 0.125 0.343 0.001 0.0032 0.405	0.014 0.027 0.075 0.0000 0.0007 0.0875	Gas/Vapor	EE	
30E	Upward Vertical Stack	30S	Tank Truck Oil/Condensate Loading Losses (King)	N/A	N/A	C	8760	VOC Total HAPs	23.117 0.0254	0.8882 0.0010	0.2312 0.0254	0.0133 0.0015	Gas/Vapor	EE	
31E	Upward Vertical Stack	31S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	Gas/Vapor	EE	
32E	Upward Vertical Stack	32S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	Gas/Vapor	EE	
33E	Upward Vertical Stack	33S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	Gas/Vapor	EE	

34E	Upward Vertical Stack	34S	Oil Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	0.5690 0.0053 0.0004 0.0002 0.0000 0.0001 0.0045 0.6725	2.4925 0.0235 0.0019 0.0009 0.0002 0.0005 0.0198 2.945	Gas/Vapor	EE	
35E	Upward Vertical Stack	35S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0113 0.0001 0.0000 0.0000 0.0000 0.0000 0.0045 0.6725	0.0498 0.0005 0.0000 0.0000 0.0000 0.0000 0.0004 2.945	0.0113 0.0001 0.0000 0.0000 0.0000 0.0000 0.0045 0.6725	0.0498 0.0005 0.0000 0.0000 0.0000 0.0000 0.0004 2.945	Gas/Vapor	EE	
36E	Upward Vertical Stack	36S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0113 0.0001 0.0000 0.0000 0.0000 0.0000 0.0045 0.6725	0.0498 0.0005 0.0000 0.0000 0.0000 0.0000 0.0004 2.945	0.0113 0.0001 0.0000 0.0000 0.0000 0.0000 0.0045 0.6725	0.0498 0.0005 0.0000 0.0000 0.0000 0.0000 0.0004 2.945	Gas/Vapor	EE	
37E	Upward Vertical Stack	37S	Water Storage Tank	IC	VRU	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.0113 0.0001 0.0000 0.0000 0.0000 0.0000 0.0045 0.6725	0.0498 0.0005 0.0000 0.0000 0.0000 0.0000 0.0004 2.945	0.0113 0.0001 0.0000 0.0000 0.0000 0.0000 0.0045 0.6725	0.0498 0.0005 0.0000 0.0000 0.0000 0.0000 0.0004 2.945	Gas/Vapor	EE	
38E	Upward Vertical Stack	38S	Tank Truck Water Loading Losses (King)	N/A	N/A	C	8760	VOC Total HAPs Benzene Toluene E-benzene Xylene n-Hexane CO2e	0.2312 0.0254 0.0015 0.0015 0.0000 0.0000 0.0004 0.589	0.0133 0.0015 0.0015 0.0015 0.0000 0.0000 0.0004 0.589	0.2312 0.0254 0.0015 0.0015 0.0000 0.0000 0.0004 0.589	0.0133 0.0015 0.0015 0.0015 0.0000 0.0000 0.0004 0.589	Gas/Vapor	EE	

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

- 1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- 2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. **DO NOT LIST** H₂, H₂O, N₂, O₂, and Noble Gases.
- 4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- 5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- 6 Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
- 7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data

Emission Point ID No. (Must match Emission Units Table)	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow ¹ (acfm) at operating conditions	Velocity (fps)	Ground Level (Height above mean sea level)	Stack Height ² (Release height of emissions above ground level)	Northing	Easting
1E	N/A	N/A						
2E-13E								
14E	N/A	N/A	N/A	N/A	1,209 ft	N/A	4253286.62	480702.56
15E	1.1	1000	N/A	N/A	1,209 ft	N/A	4253275.17	480707.6
16E-27E			364.5	6.4	1,209 ft		N/A	N/A
28E	N/A	N/A	Emissions captured in closed loop system with VRU			15	4253313.78	480741.93
29E	4	1600	N/A	N/A	1,209 ft	N/A	4253265.04	480785.52
30E	N/A	N/A	125.03	0.17	1,209 ft	23	4253275.82	480779.64
31E-34E			N/A	N/A	1,209 ft	N/A	4253310.13	480773.21
35E-37E			Emissions captured in closed loop system with VRU				4253246.37	480215.53
38E	N/A	N/A	Emissions captured in closed loop system with VRU				4253250.77	480211.25
			N/A	N/A	1,209 ft	N/A	4253256.75	480223.25
							4253272.61	480220.19

¹ Give at operating conditions. Include inerts.
² Release height of emissions above ground level.

Attachment K

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS

1.) Will there be haul road activities?

☐ Yes ☒ No

☐ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.

2.) Will there be Storage Piles?

☐ Yes ☒ No

☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.

3.) Will there be Liquid Loading/Unloading Operations?

☒ Yes ☐ No

☒ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.

4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?

☐ Yes ☒ No

☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.

5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?

☒ Yes ☐ No

☒ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.

6.) Will there be General Clean-up VOC Operations?

☐ Yes ☒ No

☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.

7.) Will there be any other activities that generate fugitive emissions?

☐ Yes ☒ No

☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.

If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY		All Regulated Pollutants - Chemical Name/CAS ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
			lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads							
Unpaved Haul Roads							
Storage Pile Emissions							
Loading/Unloading Operations							
Wastewater Treatment Evaporation & Operations		VOC Total HAPs	46.6968 0.1016	2.2418 0.0049	46.6968 0.1016	2.2418 0.0049	EE
Equipment Leaks		VOC Total HAPs CO ₂ e	Does not apply	22.56 0.16 246.246	Does not apply	22.56 0.16 246.246	EE
General Clean-up VOC Emissions							
Other							

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

² Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

³ Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁴ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

Attachment L

Attachment L EMISSIONS UNIT DATA SHEET CHEMICAL PROCESS

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

- ☐ Emergency Vent Summary Sheet
- ☒ Leak Sources Data Sheet
- ☐ Toxicology Data Sheet
- ☐ Reactor Data Sheet
- ☐ Distillation Column Data Sheet

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)
Piping for Entire Facility

2. Standard Industrial Classification Codes (SICs) for process(es)
4923

3. List raw materials and ☒ attach MSDSs
Wet Natural Gas

4. List Products and Maximum Production and ☒ attach MSDSs

Description and CAS Number	Maximum Hourly (lb/hr)	Maximum Annual (ton/year)
Crude Oil/Condensate	4.166 barrels/hr	36,500 barrels/year
Produced Water	4 barrels/hr	35,040 barrels/year
Dry Natural Gas		

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.
N/A

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.
In the event of an accidental spill or release, procedures are outlined in the SPCC Plan, maintained onsite.

- 8A. Complete the *Toxicology Data Sheet* or attach to application a toxicology report (an up-to-date material safety data sheets (MSDS) may be used) outlining the currently known acute and chronic health effects of each compound or chemical entity emitted to the air. If these compounds have already been listed in Item 3, then a duplicate MSDS sheet is not required. Include data such as the OSHA time weighted average (TWA) or mutagenicity, teratogenicity, irritation, and other known or suspected effects should be addressed. Indicate where these are unknown, and provide references.
- 8B. Describe any health effects testing or epidemiological studies on these compounds that are being or may be conducted by the company or required under TSCA, RCRA or other federal regulations. Discuss the persistence in the environment of any emission (e.g. pesticides, etc.).

9. **Waste Products** - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)

9A. Types and amounts of wastes to be disposed:

9B. Method of disposal and location of waste disposal facilities:

Carrier:

Phone:

9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used ☐

10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate units).

circle units:	(hrs/day) (hr/batch)	(days), (batches/day), (batches/week)	(days/yr), (weeks/year)
10A. Maximum	24 hrs/day	7 days	52 weeks/year
10B. Typical	24 hrs/day	7 days	52 weeks/year

11. Complete a *Reactor Data Sheet* for each reactor in this chemical process.

12. Complete a *Distillation Column Data Sheet* for each distillation column in this chemical process.

13. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING
See Attachment O

RECORDKEEPING

REPORTING

TESTING

MONITORING. Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

RECORDKEEPING. Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING. Please describe the proposed frequency of reporting of the recordkeeping.

TESTING. Please describe any proposed emissions testing for this process equipment or air pollution control device.

14. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

N/A

INFORMATION REQUIRED FOR CHEMICAL PROCESSES

The notes listed below for chemical processes are intended to help the applicant submit a complete application to the OAQ; these notes are not intended to be all inclusive. The requirements for a complete application for a permit issued under 45CSR13 are designed to provide enough information for a permit reviewer to begin a technical review. Additional information beyond that identified may be required to complete the technical review of any individual application.

Process Description

Please keep these points in mind when completing your process description as part of this permit application.

1. Provide a general process overview. This brief, but complete, process description should include chemical or registered trademark names of chemical products, intermediates, and/or raw materials to be produced or consumed, and the ultimate use(s) of the product(s). A list of the various chemical compounds is helpful.
2. Describe each process step. Include the process chemistry and stoichiometrically balanced reaction equation or material mass balance on all components.
3. Describe the methods and equipment used to receive, store, handle, and charge raw materials.
4. Describe the methods and equipment used to handle, store, or package final products and intermediates.
5. Provide process flow diagrams or equipment layout drawings which clearly show the process flow relationships among all pieces of process and control equipment. Identify all air emission discharge points. Discuss instrumentation and controls for the process.
6. Discuss the possibilities of process upsets, the duration and frequency of upsets, and consequences (including air emissions) of these upsets. Include a description of rupture discs, pressure relief valves, and secondary containment systems.
7. Discuss any fugitive emissions and the methods used to minimize them.
8. Include the following plans for the process if available:
 - a. preventative maintenance and malfunction abatement plan (recommended for all control equipment).
 - b. continuous emissions (in-stack) monitoring plan
 - c. ambient monitoring plan
 - d. emergency response plan

Regulatory Discussion

The following state and federal air pollution control regulations may be applicable to your chemical process. You should review these regulations carefully to determine if they apply to your process. Please summarize the results of your review in your permit application along with any other regulations you believe are applicable.

- Title 45 Legislative Rule Division of Environmental Protection, Office of Air Quality contains West Virginia's air pollution control regulations, including the following promulgated rules which may require emissions reductions or control technologies for your chemical process:
 - a. 45CSR27 - Best Available Technology (BAT) for Toxic Air Pollutants (TAPs)
 - b. 45CSR21 - VOC emissions controls for ozone maintenance in Kanawha, Cabell, Putnam, Wayne, and Wood counties.
 - c. 45CSR13 (Table 45-13A) - plantwide emission thresholds for permitting for certain pollutants.
- Federal Guidelines for case-by-case MACT determinations under section 112(g) of the 1990 CAAA for individual and total HAPs greater than 10 and 25 tons per year, respectively.
- There are also subparts of the federal Standards of Performance for New Stationary Sources (NSPS), 40CFR60, 60, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40CFR61 and 40CFR63, which apply to various chemical and nonchemical processes. These subparts are too numerous to list here, but these areas of the federal regulations should be consulted carefully to determine applicability to your process.

Emissions Summary and Calculations

Please keep these points in mind when submitting your emissions calculations as part of this permit application.

1. For each pollutant, provide the basis for the emissions estimate and for all emission reduction(s) or control efficiency(ies) claimed.
2. For all batch processes provide the following
 - a. Emissions of each pollutant in pound(s) per batch, from each process step
 - b. Annual emissions based on number of batches requested per year
 - c. The total time for each process step and the duration of the emissions during the process step
 - d. Total batch time, total emissions per batch (or per day), and annual emissions based on the number of batches requested per year.

EMERGENCY VENT SUMMARY SHEET

List below all emergency relief devices, rupture disks, safety relief valves, and similar openings that will vent only under abnormal conditions.

[illegible]

All routine vents (non-emergency) should be listed on the *Emission Points Data Summary Sheet*.
 1 Indicate the emission point, if any, to which source equipment normally vents. Do not use numbers to each emergency relief vent or device.
 2 List all emergency relief vents or devices.

¹ Indicate the emission point, if any, to which source equipment normally vents. Do not assign emission point ID numbers to each emergency relief vent or device.

² List all emergency relief devices next to the piece of equipment.

2 List all emergency relief devices next to the piece of equipment from which they control releases.

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	light liquid VOC ^{6,7}				
	heavy liquid VOC ⁸				
	Non-VOC ⁹				
Valves ¹⁰	Gas VOC	240	N/A		
	Light Liquid VOC	560	N/A	1st attempt - 5 days	3565.32 (EPA)
	Heavy Liquid VOC	0	N/A	1st attempt - 5 days	26,463.96 (EPA)
	Non-VOC	28	N/A	1st attempt - 5 days	0 (EPA)
Safety Relief Valves ¹¹	Gas VOC			1st attempt - 5 days	52.56 (EPA)
	Non VOC				
Open-ended Lines ¹²	VOC	83			
	Non-VOC		N/A	1st attempt - 5 days	1655.64 (EPA)
	VOC				
Sampling Connections ¹³	Non-VOC	Covered under Other			
	VOC				
Compressors	Non-VOC				
	VOC				
	Non-VOC				
Flanges	VOC	828			
	Non-VOC		N/A	1st attempt - 5 days	1471.68 (EPA)
	VOC	41			
Other	Non-VOC		N/A	1st attempt - 5 days	4581.48 (EPA)

¹⁻¹³ See notes on the following page.

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% w/w VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:

Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category "valves, gas service:" 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR ☐51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.
9. LIST CO, H₂S, mineral acids, NO, NO₂, SO₃, etc. DO NOT LIST CO₂, H₂, H₂O, N₂, O₂, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

[illegible]

¹ Indicate by "ND" where no data exists, in company's knowledge.
² Time Weighted Average, Ceiling Limit, or other, with units.
³ If inhalation data is not available, provide other data as available.
⁴ Relying on animal or human studies. Indicate if applicable.
⁵ Indicate if the data is from a specific study.

indicate if there are dermal or eye irritation effects and whether they are considered to be low, moderate, or severe.

REACTOR DATA SHEET

Provide the following information for each piece of equipment that is a potential or actual source of emissions as shown on the *Equipment List Form* and other parts of application.

Identification Number (as shown on *Equipment List Form*):

1. Name and type of equipment (e.g. CSTR, plug flow, batch, etc.)

2. Type of operation ☐ Batch ☐ Continuous ☐ Semi-batch

3. Projected Actual Equipment Operating Schedule (complete appropriate lines):

hrs/day	days/week	weeks/year
hrs/batch	batches/day, weeks (Circle one)	day, weeks/yr (Circle one)

4. Feed Data		Flow In =	(Circle one)		day, weeks/yr (Circle one)		
Material Name & CAS No.	Phase ^a	Specific Gravity	Vapor Pressure ^b	Charge Rate			Fill Time (min/batch, run) ^c
				gal/hr, or gal/batch	Normal	Max	

S = Solid, L = Liquid, G = gas or vapor
At feed conditions

a. S = Solid, L = Liquid, G = gas or vapor

b. At feed conditions

c. Total time that equipment is filling per batch or run (start-up), for tank or vessel-type equipment.

5. Provide all **chemical reactions** that will be involved (if applicable), including the residence time and any side reactions that may occur as well as gases that may be generated during these reactions. Indicate if the reaction(s) are exothermic or endothermic.

6. Maximum Temperature

°C

°F

7A. Maximum Pressure

7B. Max. Set Pressure for venting

mmHg

psig

mmHg

psig

8. Output Data Flow Out =

Material Name and CAS No.

Phase

Specific Gravity

Vapor Pressure

gal/hr or gal/batch

Hourly or Batch Output Rate

Normal

Maximum

Units

9. Complete the following emission data for equipment connected to a header exhaust system, giving emissions levels before entering header system (i.e. before control equipment).

☐ Check here if not applicable

Emission Point ID (exhaust point of header system):

Material Name and CAS No.

Maximum Potential Emission Rate (lb/hr)

Method **

** MB - material balance; EE - Engineering Estimate; TM - Test Measurement (submit test data); O - other (Explain)

☐ Check here if not applicable

11. Provide the following pertaining to auxiliary equipment that burns fuel (heaters, dryers, etc.):
- ☐ Check here if not applicable

- $\times 10^6 \text{ BTU/hr.}$

12. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION OR AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT OR AIR POLLUTION CONTROL DEVICE.

13. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NOTE: An AIR POLLUTION CONTROL DEVICE SHEET must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this reactor.

DISTILLATION COLUMN DATA SHEET

Identification Number (as assigned on <i>Equipment List Form</i>):									
1. Name and type of equipment									
#. Projected actual equipment operating schedule (complete appropriate lines): <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">hrs/day</td> <td style="text-align: center;">days/week</td> <td style="text-align: center;">weeks/year</td> </tr> <tr> <td style="text-align: center;">hrs/batch</td> <td style="text-align: center;">batches/day, batches/week (circle one)</td> <td style="text-align: center;">days/yr, weeks/yr (circle one)</td> </tr> </table>				hrs/day	days/week	weeks/year	hrs/batch	batches/day, batches/week (circle one)	days/yr, weeks/yr (circle one)
hrs/day	days/week	weeks/year							
hrs/batch	batches/day, batches/week (circle one)	days/yr, weeks/yr (circle one)							
2. Number of stages (plates), excluding condenser									
3. Number of feed plates and stage location									
4. Specify details of any reheating, recycling, or stage conditioning along with the stage locations									
5. Specify reflux ratio, R (where R is defined as the ratio of the reflux to the overhead product, given symbolically as $R=L/D$, where L = liquid down column, D = distillation product)									
6. Specify the fraction of feed which is vaporized, f (where f is the molal fraction of the feed that leaves the feed plate continuously as vapor).									
7A. Type of condenser used: <input type="checkbox"/> total <input type="checkbox"/> partial <input type="checkbox"/> multiple <input type="checkbox"/> other 7B. For each condenser provide process operating details including all inlet and outlet temperatures, pressures, and compositions.									
8. Feed Characteristics									
A. Molar composition B. Individual vapor pressure of each component C. Total feed stage pressure D. Total feed stage temperature E. Total mass flow rate of each stream into the system									
9. Overhead Product									
A. Molar composition of components B. Vapor pressure of components C. Total mass flow rate of all streams leaving the system as overhead products									
10. Bottom Product									
A. Molar composition of all components B. Total mass flow rate of all streams leaving the system as bottom products									

11. General Information

- A. Distillation column diameter
- B. Distillation column height
- C. Type of plates
- D. Plate spacing
- E. Murphree plate efficiency
- F. Any other information necessary of describe the operation of this distillation column.

12. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION OR AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT OR AIR POLLUTION CONTROL DEVICE.

13. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NOTE: An AIR POLLUTION CONTROL DEVICE SHEET must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this distillation column.

INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. Generator(s) and microturbine generator(s) shall also use this form.

Emission Unit ID# ¹		15S					
Engine Manufacturer/Model		Ajax / DPC - 105					
Manufacturers Rated bhp/rpm		101 / 425					
Source Status ²		NS					
Date Installed/ Modified/Removed/Relocated ³		2015					
Engine Manufactured /Reconstruction Date ⁴		07/1980					
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable) ⁵		<input type="checkbox"/> 40CFR60 Subpart JJJJ <input type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input checked="" type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources		<input type="checkbox"/> 40CFR60 Subpart JJJJ <input type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources		<input type="checkbox"/> 40CFR60 Subpart JJJJ <input type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources	
		Engine Type ⁶		2SLB			
APCD Type ⁷		N/A					
Fuel Type ⁸		PQ					
H ₂ S (gr/100 scf)		0.2					
Operating bhp/rpm		101 / 425					
BSFC (BTU/bhp-hr)		8800					
Hourly Fuel Throughput		388 ft ³ /hr 2902.44 gal/hr		ft ³ /hr gal/hr		ft ³ /hr gal/hr	
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)		3.4 MMft ³ /yr 25425374.4 gal/yr		MMft ³ /yr gal/yr		MMft ³ /yr gal/yr	
Fuel Usage or Hours of Operation Metered		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Yes <input type="checkbox"/> No <input type="checkbox"/>		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Calculation Methodology ⁹	Pollutant ¹⁰	Hourly PTE (lb/hr) ¹¹	Annual PTE (tons/year) ¹¹	Hourly PTE (lb/hr) ¹¹	Annual PTE (tons/year) ¹¹	Hourly PTE (lb/hr) ¹¹	Annual PTE (tons/year) ¹¹
MD	NO _x	0.982	4.30				
MD	CO	0.625	2.737				
MD	VOC	0.112	0.491				
AP-42	SO ₂	0.001	0.004				
AP-42	PM ₁₀	0.000	0.000				
MD	Formaldehyde	0.067	0.293				
MD	Total HAPs	0.075	0.328				
AP-42	GHG (CO ₂ e)	320.382	1403.275				

- 1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. Microturbine generator engines should be designated MT-1, MT-2, MT-3 etc. If more than three (3) engines exist, please use additional sheets.
- 2 Enter the Source Status using the following codes:

NS Construction of New Source (installation)
 MS Modification of Existing Source
 REM Removal of Source

ES Existing Source
 RS Relocated Source

- 3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation or removal.
 - 4 Enter the date that the engine was manufactured, modified or reconstructed.
 - 5 Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart IIII/JJJJ? If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance as appropriate.
- Provide a manufacturer's data sheet for all engines being registered.**
- 6 Enter the Engine Type designation(s) using the following codes:

2SLB Two Stroke Lean Burn		4SRB Four Stroke Rich Burn
4SLB Four Stroke Lean Burn		
 - 7 Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F Air/Fuel Ratio	IR Ignition Retard	
HEIS High Energy Ignition System	SIPC Screw-in Precombustion Chambers	
PSC Prestratified Charge	LEC Low Emission Combustion	
NSCR Rich Burn & Non-Selective Catalytic Reduction	OxCat Oxidation Catalyst	
SCR Lean Burn & Selective Catalytic Reduction		
 - 8 Enter the Fuel Type using the following codes:

PQ Pipeline Quality Natural Gas	RG Raw Natural Gas /Production Gas	D Diesel
---------------------------------	------------------------------------	----------
 - 9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

MD Manufacturer's Data	AP AP-42	
GR GRI-HAPCalc™	OT Other	(please list)
 - 10 Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.
 - 11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA's TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA's AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Oil Storage Tanks
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) 2S-13S	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) 2E-13E
5. Date of Commencement of Construction (for existing tanks) 2015	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.):	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <div style="text-align: right;">210 barrels</div>	
9A. Tank Internal Diameter (ft) <div style="text-align: center;">10</div>	9B. Tank Internal Height (or Length) (ft) <div style="text-align: center;">15</div>
10A. Maximum Liquid Height (ft) <div style="text-align: center;">13</div>	10B. Average Liquid Height (ft) <div style="text-align: center;">7.5</div>
11A. Maximum Vapor Space Height (ft) <div style="text-align: center;">1</div>	11B. Average Vapor Space Height (ft) <div style="text-align: center;">7.5</div>
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <div style="text-align: right;">210 bbls</div>	

13A. Maximum annual throughput (gal/yr) <div style="text-align: center;">76,650</div>	13B. Maximum daily throughput (gal/day) <div style="text-align: center;">210</div>
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) <div style="text-align: center;">9</div>	
15. Maximum tank fill rate (gal/min) <div style="text-align: center;">0.1458</div>	
16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical <input type="checkbox"/> horizontal <input type="checkbox"/> flat roof <input type="checkbox"/> cone roof <input type="checkbox"/> dome roof <input type="checkbox"/> other (describe)	
<input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting <input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> lifter roof <input type="checkbox"/> diaphragm <input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction: <input checked="" type="checkbox"/> Riveted <input type="checkbox"/> Gunite lined <input type="checkbox"/> Epoxy-coated rivets <input type="checkbox"/> Other (describe)		
20A. Shell Color Black	20B. Roof Color Black	20C. Year Last Painted 2015
21. Shell Condition (if metal and unlined): <input checked="" type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable		
22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
22B. If YES, provide the operating temperature (°F)		
22C. If YES, please describe how heat is provided to tank.		
23. Operating Pressure Range (psig): 0.1562 to 0.3125		
24. Complete the following section for Vertical Fixed Roof Tanks <input type="checkbox"/> Does Not Apply		
24A. For dome roof, provide roof radius (ft) 10		
24B. For cone roof, provide slope (ft/ft)		
25. Complete the following section for Floating Roof Tanks <input checked="" type="checkbox"/> Does Not Apply		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type: (check one) <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe):		
25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO		
25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe):		
25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO		

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN - SLIDING COVER, GASKETED:	BUILT-UP COLUMN - SLIDING COVER, UNGASKETED:	PIPE COLUMN - FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN - SLIDING COVER, GASKETED:	PIPE COLUMN - SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN	
1-INCH DIAMETER:	

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply

26A. Deck Type: ☐ Bolted ☐ Welded

26B. For Bolted decks, provide deck construction:

26C. Deck seam:

- ☐ Continuous sheet construction 5 feet wide
- ☐ Continuous sheet construction 6 feet wide
- ☐ Continuous sheet construction 7 feet wide
- ☐ Continuous sheet construction 5 × 7.5 feet wide
- ☐ Continuous sheet construction 5 × 12 feet wide
- ☐ Other (describe)

26D. Deck seam length (ft)

26E. Area of deck (ft²)

26F. Number of columns:

26G. Diameter of each column:

IV. SITE INFORMATION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
Charleston, WV

28. Daily Average Ambient Temperature (°F) 54.75

29. Annual Average Maximum Temperature (°F) 65.5

30. Annual Average Minimum Temperature (°F) 44.0

31. Average Wind Speed (miles/hr) 4.5

32. Annual Average Solar Insulation Factor (BTU/(ft²·day)) 1123

33. Atmospheric Pressure (psia) 14.7

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 80

34A. Minimum (°F) 70

34B. Maximum (°F) 90

35. Average operating pressure range of tank: 0.2343

35A. Minimum (psig) 0.15625

35B. Maximum (psig) 0.3125

36A. Minimum Liquid Surface Temperature (°F) 70

36B. Corresponding Vapor Pressure (psia) -14.54

37A. Average Liquid Surface Temperature (°F) 85

37B. Corresponding Vapor Pressure (psia) -14.46

38A. Maximum Liquid Surface Temperature (°F) 100

38B. Corresponding Vapor Pressure (psia) -14.38

39. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.

39A. Material Name or Composition	Crude Oil		
39B. CAS Number	8002-05-9		
39C. Liquid Density (lb/gal)	6.19		
39D. Liquid Molecular Weight (lb/lb-mole)	130.9		
39E. Vapor Molecular Weight (lb/lb-mole)	39.97		

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

- ☐ Carbon Adsorption¹
☐ Condenser¹
☐ Conservation Vent (psig)
 Vacuum Setting
☐ Emergency Relief Valve (psig)
☐ Inert Gas Blanket of
☐ Insulation of Tank with
☐ Liquid Absorption (scrubber)¹
☐ Refrigeration of Tank
☐ Rupture Disc (psig)
☐ Vent to Incinerator¹
☒ Other¹ (describe): Vapor Recovery Unit and vapors are sent to sales.

¹ Complete appropriate Air Pollution Control Device Sheet.

Material Name & CAS No.	Breathing Loss	Working Loss	

¹ EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA's TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA's AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Oil Storage Tanks
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) 31S-34S	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) 31E-34E
5. Date of Commencement of Construction (for existing tanks) 2015	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.):	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <div style="text-align: right;">210 barrels</div>	
9A. Tank Internal Diameter (ft) <div style="text-align: center;">10</div>	9B. Tank Internal Height (or Length) (ft) <div style="text-align: center;">15</div>
10A. Maximum Liquid Height (ft) <div style="text-align: center;">13</div>	10B. Average Liquid Height (ft) <div style="text-align: center;">7.5</div>
11A. Maximum Vapor Space Height (ft) <div style="text-align: center;">1</div>	11B. Average Vapor Space Height (ft) <div style="text-align: center;">7.5</div>
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <div style="text-align: right;">210 bbls</div>	

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)			
19. Tank Shell Construction:			
<input checked="" type="checkbox"/> Riveted	<input type="checkbox"/> Gunitite lined	<input type="checkbox"/> Epoxy-coated rivets	<input type="checkbox"/> Other (describe)
20A. Shell Color Black	20B. Roof Color Black	20C. Year Last Painted 2015	
21. Shell Condition (if metal and unlined):			
<input checked="" type="checkbox"/> No Rust	<input type="checkbox"/> Light Rust	<input type="checkbox"/> Dense Rust	<input type="checkbox"/> Not applicable
22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
22B. If YES, provide the operating temperature (°F)			
22C. If YES, please describe how heat is provided to tank.			
23. Operating Pressure Range (psig): 0.1562 to 0.3125			
24. Complete the following section for Vertical Fixed Roof Tanks			
4A. For dome roof, provide roof radius (ft)	10	<input type="checkbox"/> Does Not Apply	
4B. For cone roof, provide slope (ft/ft)			
25. Complete the following section for Floating Roof Tanks			
5A. Year Internal Floaters Installed:		<input checked="" type="checkbox"/> Does Not Apply	
5B. Primary Seal Type: (check one)		<input type="checkbox"/> Liquid Mounted Resilient Seal	
<input type="checkbox"/> Metallic (Mechanical) Shoe Seal		<input type="checkbox"/> Other (describe):	
<input type="checkbox"/> Vapor Mounted Resilient Seal			
5C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO			
5D. If YES, how is the secondary seal mounted? (check one)			
<input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe):			
5E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO			

25F. Describe deck fittings; indicate the number of each type of fitting:

BOLT COVER, GASKETED:	ACCESS HATCH UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
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BOLT COVER, GASKETED:	AUTOMATIC GAUGE FLOAT WELL UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
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BUILT-UP COLUMN - SLIDING COVER, GASKETED:	COLUMN WELL BUILT-UP COLUMN - SLIDING COVER, UNGASKETED:	PIPE COLUMN - FLEXIBLE FABRIC SLEEVE SEAL:
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PIP COLUMN - SLIDING COVER, GASKETED:	LADDER WELL PIPE COLUMN - SLIDING COVER, UNGASKETED:
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SLIDING COVER, GASKETED:	GAUGE-HATCH/SAMPLE PORT SLIDING COVER, UNGASKETED:
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WEIGHTED MECHANICAL ACTUATION, GASKETED:	ROOF LEG OR HANGER WELL WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
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WEIGHTED MECHANICAL ACTUATION, GASKETED:	VACUUM BREAKER WEIGHTED MECHANICAL ACTUATION, UNGASKETED:
--	--

WEIGHTED MECHANICAL ACTUATION GASKETED:	RIM VENT WEIGHTED MECHANICAL ACTUATION, UNGASKETED:
---	--

OPEN:	DECK DRAIN (3-INCH DIAMETER) 90% CLOSED:
-------	---

1-INCH DIAMETER:	STUB DRAIN
------------------	------------

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply

26A. Deck Type: ☐ Bolted ☐ Welded

26B. For Bolted decks, provide deck construction:

26C. Deck seam:

- ☐ Continuous sheet construction 5 feet wide
- ☐ Continuous sheet construction 6 feet wide
- ☐ Continuous sheet construction 7 feet wide
- ☐ Continuous sheet construction 5 × 7.5 feet wide
- ☐ Continuous sheet construction 5 × 12 feet wide
- ☐ Other (describe)

26D. Deck seam length (ft)

26E. Area of deck (ft²)

26F. Number of columns:

26G. Diameter of each column:

IV. SITE INFORMATION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
Charleston, WV

28. Daily Average Ambient Temperature (°F) 54.75

29. Annual Average Maximum Temperature (°F) 65.5

30. Annual Average Minimum Temperature (°F) 44.0

31. Average Wind Speed (miles/hr) 4.5

32. Annual Average Solar Insulation Factor (BTU/(ft²·day)) 1123

33. Atmospheric Pressure (psia) 14.7

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 80

34A. Minimum (°F) 70

34B. Maximum (°F) 90

35. Average operating pressure range of tank: 0.2343

35A. Minimum (psig) 0.15625

35B. Maximum (psig) 0.3125

36A. Minimum Liquid Surface Temperature (°F) 70

36B. Corresponding Vapor Pressure (psia) -14.54

37A. Average Liquid Surface Temperature (°F) 85

37B. Corresponding Vapor Pressure (psia) -14.46

38A. Maximum Liquid Surface Temperature (°F) 100

38B. Corresponding Vapor Pressure (psia) -14.38

39. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.

39A. Material Name or Composition	Crude Oil		
39B. CAS Number	8002-05-9		
39C. Liquid Density (lb/gal)	6.19		
39D. Liquid Molecular Weight (lb/lb-mole)	130.9		
39E. Vapor Molecular Weight (lb/lb-mole)	39.97		

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Water Storage Tanks
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) 16S-27S	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) 16E-27E
5. Date of Commencement of Construction (for existing tanks) 2015	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.):	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft) 10	9B. Tank Internal Height (or Length) (ft) 15
10A. Maximum Liquid Height (ft) 13	10B. Average Liquid Height (ft) 7.5
11A. Maximum Vapor Space Height (ft) 1	11B. Average Vapor Space Height (ft) 7.5
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 210 bbls	

13A. Maximum annual throughput (gal/yr) 45,990	13B. Maximum daily throughput (gal/day) 126
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) 6	
15. Maximum tank fill rate (gal/min) 0.0875	
16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical <input type="checkbox"/> horizontal <input type="checkbox"/> flat roof <input type="checkbox"/> cone roof <input type="checkbox"/> dome roof <input type="checkbox"/> other (describe)	
<input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting <input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> lifter roof <input type="checkbox"/> diaphragm <input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if any of the above are checked)

19. Tank Construction

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:			
<input checked="" type="checkbox"/> Riveted	<input type="checkbox"/> Gunit lined	<input type="checkbox"/> Epoxy-coated rivets	<input type="checkbox"/> Other (describe)
20A. Shell Color Black	20B. Roof Color Black	20C. Year Last Painted 2015	
21. Shell Condition (if metal and unlined):			
<input checked="" type="checkbox"/> No Rust	<input type="checkbox"/> Light Rust	<input type="checkbox"/> Dense Rust	<input type="checkbox"/> Not applicable
22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
22B. If YES, provide the operating temperature (°F)			
22C. If YES, please describe how heat is provided to tank.			
23. Operating Pressure Range (psig): 0.1562 to 0.3125			
24. Complete the following section for Vertical Fixed Roof Tanks <input type="checkbox"/> Does Not Apply			
24A. For dome roof, provide roof radius (ft) 10			
24B. For cone roof, provide slope (ft/ft)			
25. Complete the following section for Floating Roof Tanks <input checked="" type="checkbox"/> Does Not Apply			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type: <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal			
(check one) <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe):			
25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO			
25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe):			
25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO			

25F. Describe deck fittings; indicate the number of each type of fitting:		
BOLT COVER, GASKETED:	ACCESS HATCH UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
BOLT COVER, GASKETED:	AUTOMATIC GAUGE FLOAT WELL UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
BUILT-UP COLUMN - SLIDING COVER, GASKETED:	COLUMN WELL BUILT-UP COLUMN - SLIDING COVER, UNGASKETED:	PIPE COLUMN - FLEXIBLE FABRIC SLEEVE SEAL:
PIP COLUMN - SLIDING COVER, GASKETED:	LADDER WELL PIPE COLUMN - SLIDING COVER, UNGASKETED:	
SLIDING COVER, GASKETED:	GUAGE-HATCH/SAMPLE PORT SLIDING COVER, UNGASKETED:	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	ROOF LEG OR HANGER WELL WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
WEIGHTED MECHANICAL ACTUATION, GASKETED:	VACUUM BREAKER WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
WEIGHTED MECHANICAL ACTUATION GASKETED:	RIM VENT WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
OPEN:	DECK DRAIN (3-INCH DIAMETER) 90% CLOSED:	
1-INCH DIAMETER:	STUB DRAIN	
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply

26A. Deck Type: ☐ Bolted ☐ Welded

26B. For Bolted decks, provide deck construction:

26C. Deck seam:

- ☐ Continuous sheet construction 5 feet wide
- ☐ Continuous sheet construction 6 feet wide
- ☐ Continuous sheet construction 7 feet wide
- ☐ Continuous sheet construction 5 × 7.5 feet wide
- ☐ Continuous sheet construction 5 × 12 feet wide
- ☐ Other (describe)

26D. Deck seam length (ft)

26E. Area of deck (ft²)

26F. Number of columns:

26G. Diameter of each column:

IV. SITE INFORMATION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
Charleston, WV

28. Daily Average Ambient Temperature (°F) 54.75

29. Annual Average Maximum Temperature (°F) 65.5

30. Annual Average Minimum Temperature (°F) 44.0

31. Average Wind Speed (miles/hr) 4.5

32. Annual Average Solar Insulation Factor (BTU/(ft²·day)) 1123

33. Atmospheric Pressure (psia) 14.7

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 80

34A. Minimum (°F) 70

34B. Maximum (°F) 90

35. Average operating pressure range of tank: 0.2343

35A. Minimum (psig) 0.15625

35B. Maximum (psig) 0.3125

36A. Minimum Liquid Surface Temperature (°F) 70

36B. Corresponding Vapor Pressure (psia) -14.54

37A. Average Liquid Surface Temperature (°F) 85

37B. Corresponding Vapor Pressure (psia) -14.46

38A. Maximum Liquid Surface Temperature (°F) 100

38B. Corresponding Vapor Pressure (psia) -14.38

39. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.

39A. Material Name or Composition	Produced Water		
39B. CAS Number	N/A		
39C. Liquid Density (lb/gal)	8.3121		
39D. Liquid Molecular Weight (lb/lb-mole)	N/A		
39E. Vapor Molecular Weight (lb/lb-mole)	N/A		

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Water Storage Tanks
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) 35S-37S	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) 35E-37E
5. Date of Commencement of Construction (for existing tanks) 2015	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.):	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft) 10	210 barrels 9B. Tank Internal Height (or Length) (ft) 15
10A. Maximum Liquid Height (ft) 13	10B. Average Liquid Height (ft) 7.5
11A. Maximum Vapor Space Height (ft) 1	11B. Average Vapor Space Height (ft) 7.5
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 210 bbls	

25F. Describe deck fittings; indicate the number of each type of fitting:		
BOLT COVER, GASKETED:	ACCESS HATCH UNBOLTED COVER, GASKETED: UNBOLTED COVER, UNGASKETED:	
BOLT COVER, GASKETED:	AUTOMATIC GAUGE FLOAT WELL UNBOLTED COVER, GASKETED: UNBOLTED COVER, UNGASKETED:	
BUILT-UP COLUMN - SLIDING COVER, GASKETED:	COLUMN WELL BUILT-UP COLUMN - SLIDING COVER, UNGASKETED:	PIPE COLUMN - FLEXIBLE FABRIC SLEEVE SEAL:
PIP COLUMN - SLIDING COVER, GASKETED:		LADDER WELL PIPE COLUMN - SLIDING COVER, UNGASKETED:
SLIDING COVER, GASKETED:	GAUGE-HATCH/SAMPLE PORT SLIDING COVER, UNGASKETED:	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	ROOF LEG OR HANGER WELL WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
WEIGHTED MECHANICAL ACTUATION, GASKETED:		VACUUM BREAKER WEIGHTED MECHANICAL ACTUATION, UNGASKETED:
WEIGHTED MECHANICAL ACTUATION GASKETED:		RIM VENT WEIGHTED MECHANICAL ACTUATION, UNGASKETED:
OPEN:	DECK DRAIN (3-INCH DIAMETER) 90% CLOSED:	
1-INCH DIAMETER:	STUB DRAIN	
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks		<input checked="" type="checkbox"/> Does Not Apply
26A. Deck Type:	<input type="checkbox"/> Bolted	<input type="checkbox"/> Welded
26B. For Bolted decks, provide deck construction:		
26C. Deck seam:		
<input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)		
26D. Deck seam length (ft)	26E. Area of deck (ft ²)	
For column supported tanks:	26G. Diameter of each column:	
26F. Number of columns:		

IV. SITE INFORMATION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.	
Charleston, WV	
28. Daily Average Ambient Temperature (°F)	54.75
29. Annual Average Maximum Temperature (°F)	65.5
30. Annual Average Minimum Temperature (°F)	44.0
31. Average Wind Speed (miles/hr)	4.5
32. Annual Average Solar Insulation Factor (BTU/(ft ² ·day))	1123
33. Atmospheric Pressure (psia)	14.7

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 80			
34A. Minimum (°F)	70	34B. Maximum (°F)	90
35. Average operating pressure range of tank: 0.2343			
35A. Minimum (psig)	0.15625	35B. Maximum (psig)	0.3125
36A. Minimum Liquid Surface Temperature (°F)	70	36B. Corresponding Vapor Pressure (psia)	-14.54
37A. Average Liquid Surface Temperature (°F)	85	37B. Corresponding Vapor Pressure (psia)	-14.46
38A. Maximum Liquid Surface Temperature (°F)	100	38B. Corresponding Vapor Pressure (psia)	-14.38
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition	Produced Water		
39B. CAS Number	N/A		
39C. Liquid Density (lb/gal)	8.3121		
39D. Liquid Molecular Weight (lb/lb-mole)	N/A		
39E. Vapor Molecular Weight (lb/lb-mole)	N/A		

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on <i>Equipment List Form</i>): 1S, 28S, 30S, 38S				
1. Loading Area Name: Tank Truck Water and Oil/Condensate Loading Losses				
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): <input type="checkbox"/> Drums <input type="checkbox"/> Marine Vessels <input type="checkbox"/> Rail Tank Cars <input checked="" type="checkbox"/> Tank Trucks				
3. Loading Rack or Transfer Point Data:				
Number of pumps	None- use truck pumps			
Number of liquids loaded	2			
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	2			
4. Does ballasting of marine vessels occur at this loading area? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Does not apply				
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point: N/A				
6. Are cargo vessels pressure tested for leaks at this or any other location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, describe:				
7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	10	10	10	10
days/week	5	5	5	5

weeks/quarter	all	all	all	all
---------------	-----	-----	-----	-----

8. Bulk Liquid Data (add pages as necessary):

Pump ID No.	N/A	N/A	N/A	N/A		
Liquid Name	Oil/Condensate Unit ID: 1S	Produced Water Unit ID: 28S	Oil/Condensate Unit ID: 30S	Produced Water Unit ID: 38S		
Max. daily throughput (1000 gal/day)	2.5	1.5	1.667	2.5		
Max. annual throughput (1000 gal/yr)	919.8	551.8	613.2	919.8		
Loading Method ¹	SUB	SUB	SUB	SUB		
Max. Fill Rate (gal/min)	133	133	133	133		
Average Fill Time (min/loading)	66	66	66	66		
Max. Bulk Liquid Temperature (°F)	90	80	90	80		
True Vapor Pressure ²	0.32 psig	N/A	0.32 psig	N/A		
Cargo Vessel Condition ³	C	C	C	C		
Control Equipment or Method ⁴	N/A	N/A	N/A	N/A		
Minimum control efficiency (%)	0%	0%	0%	0%		
Maximum Emission Rate	Loading (lb/hr)	23.117	0.2312	23.117	0.2312	
	Annual (lb/yr)	2,664.6	16	1764	26.6	
Estimation Method ⁵	EPA	EPA	EPA	EPA		

¹ BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

² At maximum bulk liquid temperature

³ B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

⁴ List as many as apply (complete and submit appropriate *Air Pollution Control Device* Sheets): CA = Carbon Adsorption LOA = Lean Oil Adsorption
 Condensation SC = Scrubber (Absorption) CO =
 Refrigeration-Absorption TO = Thermal Oxidation or Incineration
 CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system)
 O = other (describe)

⁵ EPA = EPA Emission Factor as stated in AP-42
 MB = Material Balance

TM = Test Measurement based upon test data submittal
O = other (describe)

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

See Attachment O

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

N/A

Attachment M

Attachment M **Air Pollution Control Device Sheet** **(FLARE SYSTEM)**

Control Device ID No. (must match Emission Units Table):

Equipment Information

1. Manufacturer: COMM Engineering Model No. 4		2. Method: <input type="checkbox"/> Elevated flare <input type="checkbox"/> Ground flare <input checked="" type="checkbox"/> Other Back-up Combustor Describe	
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.			
4. Method of system used: <input type="checkbox"/> Steam-assisted <input type="checkbox"/> Air-assisted <input type="checkbox"/> Pressure-assisted <input checked="" type="checkbox"/> Non-assisted			
5. Maximum capacity of flare: <div style="text-align: right;">86.80 scf/min</div> <div style="text-align: right;">5208.33 scf/hr</div>		6. Dimensions of stack: <div style="text-align: right;">Diameter 4 ft.</div> <div style="text-align: right;">Height 23 ft.</div>	
7. Estimated combustion efficiency: (Waste gas destruction efficiency) <div style="text-align: right;">Estimated: 98 %</div> <div style="text-align: right;">Minimum guaranteed: 98 %</div>		8. Fuel used in burners: <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> Fuel Oil, Number <input type="checkbox"/> Other, Specify:	
9. Number of burners: 1 Rating: 12.2 MMBTU/HR BTU/hr		11. Describe method of controlling flame: Air inlet flame arresotr	
10. Will preheat be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
12. Flare height: 23 ft		14. Natural gas flow rate to flare pilot flame per pilot light: <div style="text-align: right;">19 scf/hr</div>	
13. Flare tip inside diameter: ft			
15. Number of pilot lights: 1 Total 22,800 BTU/hr		16. Will automatic re-ignition be used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
17. If automatic re-ignition will be used, describe the method: Upon detecting lose of flame, ignitor will spark.			
18. Is pilot flame equipped with a monitor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, what type? <input type="checkbox"/> Thermocouple <input type="checkbox"/> Infra-Red <input type="checkbox"/> Ultra Violet <input type="checkbox"/> Camera with monitoring control room <input checked="" type="checkbox"/> Other, Describe: Flame ionization			
19. Hours of unit operation per year: 8760			

Steam Injection	
20. Will steam injection be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	21. Steam pressure Minimum Expected: PSIG Design Maximum: PSIG
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned			
Name	Quantity Grains of H ₂ S/100 ft ³	Quantity (LB/hr, ft ³ /hr, etc)	Source of Material
Field Natural Gas	0	180 scf/hr	N/A
30. Estimate total combustible to flare: 21.0509 lb/hr (Maximum mass flow rate of waste gas) LB/hr or ACF/hr			
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.: 21.0509 lb/hr scfm LB/hr or ACF/hr			
32. Give composition of carrier gases: Included in calculations.			
33. Temperature of emission stream: °F Heating value of emission stream: BTU/ft ³ Mean molecular weight of emission stream: MW = lb/lb-mole		34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf	
35. Temperature of flare gas: °F		36. Flare gas flow rate: scf/min	
37. Flare gas heat content: BTU/ft ³		38. Flare gas exit velocity: scf/min	
39. Maximum rate during emergency for one major piece of equipment or process unit: scf/min			
40. Maximum rate during emergency for one major piece of equipment or process unit: BTU/min			
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):			
42. Describe the collection material disposal system:			
43. Have you included Flare Control Device in the Emissions Points Data Summary Sheet? Yes			

44. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:

RECORDKEEPING:

REPORTING:

TESTING:

MONITORING:

RECORDKEEPING:
REPORTING:

TESTING:

Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
Please describe the proposed recordkeeping that will accompany the monitoring.
Please describe any proposed emissions testing for this process equipment on air pollution control device.
Please describe any proposed emissions testing for this process equipment on air pollution control device.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
98%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
98%

47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
N/A

Attachment N

Company Name: Cunningham Energy, LLC
 Facility Name: Cochran and King Pad
 Emission Unit ID: 1S
 Emission Point ID: 1E
 Control Devices: None
 Source Description: Tank Truck Oil/Condensate Loading Losses

Using equation $L_L = 12.46 \cdot \text{SPM/T}$ from AP-42, Chapter 5, Section 5.2-4

S =	0.6	= Saturation Factor
P =	4	= True vapor pressure of liquid loaded (psia)
M =	52.28	= Molecular Weight of Vapors (lb/lb-mole)
T =	539.67	= Temperature of bulk liquid loaded (in degrees Rankine)
Hourly Loading Rate	7980	= Gallons Loaded per Hour
Annual Loading Rate	919800	= Gallons Loaded per Year
Control	0	= Efficiency of any Control Device (e.g. a VRU)
L_L =	2.8969	= Loading Loss (In pounds of VOC released per 1000 gallons of liquid loaded)
VOC lb/hr =	23.1174	
VOC tpy =	1.3323	
HAP lb/hr* =	0.0254	
HAP tpy* =	0.0015	

Note: Use default wt% for HAP = 0.11%

Company: Cunningham Energy, LLC
 Facility: Cochran and King Pad
 Emission Unit ID: 14S
 Emission Point ID: 14E
 Control Devices: None
 Source Description: Pneumatic Controllers

Quantity of controllers: 16
 Gas Vent Rate: 1.2 SCFH*
 Annual Operation: 8760 hr/yr
 Total Gas Vented: 19.20 SCFH
 Emissions: 1.969 lb/hr gas (total gas stream)
 17248.44 lb/year gas
 8.624 ton/year gas

Emission Speciation:

Component	Mole Percentage	Molecular Weight	Mole Fraction x Molec Weight	Weight Fraction	avg lbs/hr	tons/yr
Nitrogen	0.177%	28.013	0.050	0.0013	0.0026	0.0112
Carbon Dioxide	0.000%	44.010	0.000	0.0000	0.0000	0.0000
Methane	17.218%	16.043	2.762	0.0711	0.1400	0.6132
Ethane	30.330%	30.070	9.120	0.2347	0.4621	2.0241
Propane	31.335%	44.097	13.818	0.3556	0.7002	3.0667
iso-Butane	5.207%	58.123	3.027	0.0779	0.1534	0.6718
n-Butane	10.675%	58.123	6.205	0.1597	0.3144	1.3773
iso-Pentane	2.417%	72.150	1.744	0.0449	0.0884	0.3872
n-Pentane	1.642%	72.150	1.185	0.0305	0.0601	0.2630
Other Hexanes	0.405%	86.178	0.349	0.0090	0.0177	0.0776
*n-Hexane	0.222%	86.178	0.191	0.0049	0.0096	0.0423
*Benzene	0.022%	78.114	0.017	0.0004	0.0008	0.0034
*Toluene	0.008%	92.141	0.008	0.0002	0.0004	0.0017
*Ethylbenzene	0.001%	106.167	0.002	0.0000	0.0001	0.0003
*Xylenes	0.004%	106.167	0.004	0.0001	0.0002	0.0009
*Trimethylpentane	0.000%	114.231	0.000	0.0000	0.0000	0.0000
Heptanes	0.201%	100.272	0.202	0.0052	0.0102	0.0448
Octanes	0.058%	114.231	0.066	0.0017	0.0033	0.0147
Nonanes	0.008%	128.258	0.011	0.0003	0.0005	0.0023
Decanes+	0.070%	142.280	0.099	0.0026	0.0050	0.0220
	100.000%	Molecular Weight =	38.8582	1.0001		

Total Non-Toxic VOCs	1.3532	5.9274
Total Toxic VOCs	0.0111	0.0486
Total VOCs (includes toxics)	1.3643	5.9760

Notes:

Component lbs/hr = (lbs HC/hr)(component weight fraction)
 Component tons/yr = (tons HC/yr)(component weight fraction)

Company Name: **Cunningham Energy, LLC**
 Facility: **Cochran and King Pad**
 Emission Unit ID: **15S**
 Emission Point ID: **15E**
 Control Device: **None**
 Source Description: **VRU Natural Gas Compressor Engine**
 Engine Type: **Lean-burn, 4-stroke**

Emission Calculations:

Rated Engine Capacity: **101** hp
 Btu Value of Fuel Gas: **2291.54** Btu/scf
 Engine Heat Input: **8800** Btu/hp-hr
 Hours Operated for Year: **8760** hrs
 Calculated Heat Rate: **0.89** MMBtu/hr
 Calculated Fuel Use: **388** cu. ft./hr;
3.4 MMCF/yr
 Percent Operation for Year: **100.00** %

	Pollutant	Factor lb/MMBTU	g/hp-hr	Avg. lbs/hr	Total tons/yr	Source of Factor
CRITERIA	NOx	1.103	4.40	0.982	4.300	Manufacturer Data
	CO	0.702	2.80	0.625	2.737	Manufacturer Data
	PM ₁₀	7.71E-05	0.0003	0.000	0.000	AP-42, Table 3.2-2, 7/00
	SO ₂ ¹	9.19E-04	0.004	0.001	0.004	AP-42, Table 3.2-2, 7/00 - Adjusted ¹
	VOC	0.125	0.500	0.112	0.491	Manufacturer Data
TOXIC AIR POLLUTANTS	N-Hexanes	1.11E-03	0.004	0.001	0.004	AP-42, Table 3.2-2, 7/00
	Formaldehyde	0.0752	0.300	0.067	0.293	Manufacturer Data
	Acetaldehyde	8.36E-03	0.033	0.007	0.031	AP-42, Table 3.2-2, 7/00
	Benzene	4.40E-04	0.002	0.000	0.000	AP-42, Table 3.2-2, 7/00
	Toluene	4.08E-04	0.002	0.000	0.000	AP-42, Table 3.2-2, 7/00
	Ethylbenzene	3.97E-05	0.0002	0.000	0.000	AP-42, Table 3.2-2, 7/00
	Xylenes	1.84E-04	0.001	0.000	0.000	AP-42, Table 3.2-2, 7/00
	Total TAP			0.075	0.328	
OTHER	Methane	1.25E+00	4.990	1.113	4.875	AP-42, Table 3.2-2, 7/00
	Ethane	1.05E-01	0.419	0.093	0.407	AP-42, Table 3.2-2, 7/00
	TOC	1.47E+00	5.868	1.308	5.729	AP-42, Table 3.2-2, 7/00
	Non-toxic VOC (Heptane+)			0.037	0.163	= VOC - Total TAPs
	CO _{2E}			320.363	1403.275	

Additional Notes:

1. The AP-42 factor for SO₂ is based on a fuel content of 2000 gr H₂S/10⁶ scf (3.2 ppm). This calculation adjusts the factor for 5 ppm H₂S.

Company Name: Cunningham Energy, LLC
 Facility Name: Cochran and King Pad
 Emission Unit ID: 28S
 Emission Point ID: 28E
 Control Devices: None
 Source Description: Tank Truck Water Loading Losses

Using equation $L_L = 12.46 \cdot \text{SPM}/T$ from AP-42, Chapter 5, Section 5.2-4

S =	0.6	= Saturation Factor
P =	4	= True vapor pressure of liquid loaded (psia)
M =	52.28	= Molecular Weight of Vapors (lb/lb-mole)
T =	539.67	= Temperature of bulk liquid loaded (in degrees Rankine)
Hourly Loading Rate	7980.000	= Gallons Loaded per Hour
Annual Loading Rate	551880	= Gallons Loaded per Year
Control	0	= Efficiency of any Control Device (e.g. a VRU)
$L_L =$	2.8969	= Loading Loss (in pounds of VOC released per 1000 gallons of liquid loaded)
VOC lb/hr =	23.1174	
VOC tpy =	0.7994	
Assume 1% VOC lb/hr =	0.2312	
Assume 1% VOC tpy =	0.0080	
HAP lb/hr* =	0.0254	
HAP tpy* =	0.0009	

Note: Use default wt% for HAP = 0.11%

Company Name: Cunningham Energy, LLC
Facility: Cochran and King Pad
Emission Unit ID: 28S
Emission Point ID: 28E
Control Devices: N/A
Source Description: Back-up Combustor

Control Combustor Emissions:

Pollutant	Emission Factor		Emission Rate		Source
	lb/MMBTU	lbs/hr	TPY*		
NOx	0.138	0.063	0.014		TCEQ Guidance - Non-steam assisted, high BTU
CO	0.2755	0.125	0.027		TCEQ Guidance - Non-steam assisted, high BTU
VOC	% Residual				
	2.0	0.343	0.075		Manufacturer Data
PM ₁₀	lb/MMSCF				
PM _{2.5}	7.6	0.001	0.000		AP-42, Table 1.4-2
SO ₂ (Sweet waste gas)	5.7	0.001	0.000		AP-42, Table 1.4-2
	0.9375	0.000	0.000		AP-42, Table 1.4-2. See Note 1 below.

Gas to Control Combustor:

Component	Combined Feed		Weight %	Combined Gas to Combustor		Component Heating Value, BTU/lb	Component Heat Rate, MMBTU/hr	Gas Emitted from Combustor	
	Rate, lb/hr	Specific Volume, ft ³ /lb		Volume, ft ³ /hr	Volumetric Flow Rate, MMSCF/hr			Emission Rate, lb/hr	Combustor Emissions, tpy*
Nitrogen	0.0141	13.547	0.0688%	0.00E+00	1.90E-07	0.0	0.0000	0.0003	0.0001
Carbon Dioxide	0.0000	8.623	0.0000%	0.00E+00	0.00E+00	0.0	0.0000	0.0000	0.0000
Methane	0.8102	23.650	3.8489%	12.620	1.92E-05	1009.7	0.0193	0.0162	0.0035
Propane	3.0853	14.6564%	14.6564%	8.608	3.86E-05	1768.7	0.0689	0.0617	0.0135
iso-Butane	6.9276	32.9088%	32.9088%	6.529	5.96E-05	2517.2	0.1501	0.1386	0.0303
n-Butane	2.3584	11.2033%	11.2033%	6.529	1.54E-05	3262.0	0.0502	0.0472	0.0103
iso-Pentane	5.1154	24.3001%	24.3001%	5.260	3.34E-05	3262.6	0.1086	0.1023	0.0224
n-Pentane	1.2681	6.0238%	6.0238%	5.260	6.67E-06	4008.7	0.0267	0.0254	0.0056
i-Hexanes	0.8685	4.1303%	4.1303%	4.404	4.57E-06	3999.7	0.183	0.174	0.0038
n-Hexane	0.2379	1.1303%	1.1303%	4.404	1.05E-06	4756.1	0.0050	0.0048	0.0010
Benzene	0.1365	0.6486%	0.6486%	4.404	6.01E-07	4756.1	0.0029	0.0027	0.0006
Toluene	0.0131	0.0620%	0.0620%	4.858	6.34E-08	3741.9	0.0002	0.0003	0.0001
Ethylbenzene	0.0060	0.0286%	0.0286%	4.119	2.48E-08	4474.8	0.0001	0.0001	0.0000
Xylenes	0.0010	0.0048%	0.0048%	3.574	3.57E-09	5222.1	0.0000	0.0000	0.0000
Trimethylpentane	0.0040	0.0191%	0.0191%	3.574	1.44E-08	5209.7	0.0001	0.0001	0.0000
Heptanes	0.0000	0.0000%	0.0000%	3.322	0.00E+00	6248.9	0.0000	0.0000	0.0000
Octanes	0.1446	0.6868%	0.6868%	3.787	5.48E-07	5502.8	0.0030	0.0029	0.0006
Nonanes	0.0502	0.2385%	0.2385%	3.322	1.67E-07	6248.9	0.0010	0.0010	0.0002
Decanes +	0.0090	0.0429%	0.0429%	2.959	2.67E-08	6896.3	0.0002	0.0002	0.0000
	0.0000	0.0000%	0.0000%	2.667	0.00E+00	7743.1	0.0000	0.0000	0.0000
Total Gas	21.0509				1.80E-04			0.4210	0.0922
Total VOC	17.1413								

References:

- The AP-42 factor for SO₂ is based on a fuel content of 2000 gr H₂S/10⁶ scf (3.2 ppmv). This calculation adjusts the factor for 5 ppm(v) H₂S.
- Total tons per year is based on operating time of 5% VRU downtime (438 hours).

Total Non-toxic VOCs	0.3396
Total Toxic VOCs	0.0032
Total VOCs (including TAPs)	0.3428
	0.0751

Company Name: Cunningham Energy, LLC
Facility: Cochran and King Pad

Combined Feed Rate to Back-up Combustor

Component	Oil Storage (Cochran), lb/hr	Oil Storage (King), lb/hr	Water Storage (Cochran), lb/hr	Water Storage (King), lb/hr	Combined Feed Rate, lb/hr*
Nitrogen	0.0050	0.0090	0.0000	0.0000	0.0141
Carbon Dioxide	0.0000	0.0000	0.0000	0.0000	0.0000
Methane	0.2690	0.5380	0.0016	0.0016	0.8102
Ethane	1.0240	2.0490	0.0062	0.0062	3.0853
Propane	2.3000	4.6000	0.0138	0.0138	6.9276
n-Butane	0.7830	1.5660	0.0047	0.0047	2.3584
Iso-Butane	1.6980	3.3970	0.0102	0.0102	5.1154
N-Pentane	0.4210	0.8420	0.0025	0.0025	1.2681
Iso-Pentane	0.2890	0.5770	0.0017	0.0017	0.8695
Iso-Hexanes	0.0790	0.1580	0.0005	0.0005	0.2379
*N-Hexane	0.0450	0.0910	0.0003	0.0003	0.1365
*Benzene	0.0040	0.0090	0.0000	0.0000	0.0131
*Toluene	0.0020	0.0040	0.0000	0.0000	0.0060
*Ethylbenzene	0.0000	0.0010	0.0000	0.0000	0.0010
*Xylenes	0.0010	0.0030	0.0000	0.0000	0.0040
*Trimethylpentane	0.0000	0.0000	0.0000	0.0000	0.0000
Heptanes	0.0480	0.0960	0.0003	0.0003	0.1446
Octanes	0.0170	0.0330	0.0001	0.0001	0.0502
Nonanes	0.0030	0.0060	0.0000	0.0000	0.0090
Decanes +	0.0000	0.0000	0.0000	0.0000	0.0000

Company Name: Cunningham Energy, LLC
 Facility Name: Cochran and King Pad
 Emission Unit ID: 30S
 Emission Point ID: 30E
 Control Devices: None
 Source Description: Tank Truck Oil/Condensate Loading Losses

Using equation $L_L = 12.46 \cdot \text{SPM}/T$ from AP-42, Chapter 5, Section 5.2-4

S =	0.6	= Saturation Factor
P =	4	= True vapor pressure of liquid loaded (psia)
M =	52.28	= Molecular Weight of Vapors (lb/lb-mole)
T =	539.67	= Temperature of bulk liquid loaded (in degrees Rankine)
Hourly Loading Rate	7980	= Gallons Loaded per Hour
Annual Loading Rate	613200	= Gallons Loaded per Year
Control	0	= Efficiency of any Control Device (e.g. a VRU)
$L_L =$	2.8969	= Loading Loss (in pounds of VOC released per 1000 gallons of liquid loaded)
VOC lb/hr =	23.1174	
VOC tpy =	0.8882	
HAP lb/hr* =	0.0254	
HAP tpy* =	0.0010	

Note: Use default wt% for HAP = 0.11%

Company Name: Cunningham Energy, LLC
 Facility Name: Cochran and King Pad
 Emission Unit ID: 38S
 Emission Point ID: 38E
 Control Devices: None
 Source Description: Tank Truck Water Loading Losses

Using equation $L_L = 12.46 \cdot \text{SPM/T}$ from AP-42, Chapter 5, Section 5.2-4

S =	0.6	= Saturation Factor
P =	4	= True vapor pressure of liquid loaded (psia)
M =	52.28	= Molecular Weight of Vapors (lb/lb-mole)
T =	539.67	= Temperature of bulk liquid loaded (in degrees Rankine)
Hourly Loading Rate	7980.000	= Gallons Loaded per Hour
Annual Loading Rate	919800	= Gallons Loaded per Year
Control	0	= Efficiency of any Control Device (e.g. a VRU)
$L_L =$	2.8969	= Loading Loss (in pounds of VOC released per 1000 gallons of liquid loaded)
VOC lb/hr =	23.1174	
VOC tpy =	1.3323	
Assume 1% VOC lb/hr =	0.2312	
Assume 1% VOC tpy =	0.0133	
HAP lb/hr* =	0.0254	
HAP tpy* =	0.0015	

Note: Use default wt% for HAP = 0.11%

Typical Facility Component counts

* Emission factors are for oil and gas production facilities (not refineries) and come from the EPA's "Protocol for Equipment Leak Emission Estimating" November 1998, EPA 431, R-98-017, Table 2-4.

January 30, 2015

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Cunningham Energy
3230 Pennsylvania Ave
Charleston, WV 25302

Sample: Cochran 5H
Well Head Hydrocarbon Liquid
Sampled @ 145 psig & 72 °F

Date Sampled: 11/04/14

Job Number: 46154.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.036	0.007	0.008
Carbon Dioxide	0.000	0.000	0.000
Methane	3.571	1.084	0.438
Ethane	7.256	3.476	1.667
Propane	11.157	5.506	3.758
Isobutane	3.376	1.979	1.499
n-Butane	9.186	5.188	4.079
2,2 Dimethylpropane	0.162	0.111	0.089
Isopentane	5.289	3.465	2.915
n-Pentane	4.997	3.245	2.754
2,2 Dimethylbutane	0.227	0.170	0.150
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.426	0.312	0.280
2 Methylpentane	2.226	1.655	1.466
3 Methylpentane	1.299	0.950	0.855
n-Hexane	3.060	2.253	2.014
Heptanes Plus	<u>47.732</u>	<u>70.598</u>	<u>78.030</u>
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity -----	0.8213	(Water=1)
°API Gravity -----	40.78	@ 60°F
Molecular Weight -----	214.0	
Vapor Volume -----	12.18	CF/Gal
Weight -----	6.84	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity -----	0.7431	(Water=1)
°API Gravity -----	58.92	@ 60°F
Molecular Weight -----	130.9	
Vapor Volume -----	18.02	CF/Gal
Weight -----	6.19	Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
Processor: XGdjv
Cylinder ID: W-2144

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.036	0.007	0.008
Methane	3.571	1.084	0.438
Ethane	7.256	3.476	1.667
Propane	11.157	5.506	3.758
Isobutane	3.376	1.979	1.499
n-Butane	9.348	5.299	4.168
Isopentane	5.289	3.465	2.915
n-Pentane	4.997	3.245	2.754
Other C-6's	4.179	3.088	2.751
Heptanes	7.159	5.538	5.253
Octanes	7.601	6.347	6.244
Nonanes	3.639	3.578	3.529
Decanes Plus	27.143	53.732	61.352
Benzene	0.323	0.162	0.193
Toluene	0.511	0.307	0.360
E-Benzene	0.294	0.203	0.238
Xylenes	1.061	0.731	0.861
n-Hexane	3.060	2.253	2.014
2,2,4 Trimethylpentane	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity -----	0.7431 (Water=1)
°API Gravity -----	58.92 @ 60°F
Molecular Weight -----	130.9
Vapor Volume -----	18.02 CF/Gal
Weight -----	6.19 Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity -----	0.8485 (Water=1)
Molecular Weight -----	295.9

Characteristics of Atmospheric Sample:

°API Gravity -----	49.84 @ 60°F
Reid Vapor Pressure (ASTM D-5191) -----	6.63 psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	-----	W-2144*	W-2517
Pressure, PSIG	145	147	149
Temperature, °F	72	70	70

* Sample used for analysis

TOTAL EXTENDED REPORT - GPA 2186-M

Job Number: 46154.002

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.036	0.007	0.008
Carbon Dioxide	0.000	0.000	0.000
Methane	3.571	1.084	0.438
Ethane	7.256	3.476	1.667
Propane	11.157	5.506	3.758
Isobutane	3.376	1.979	1.499
n-Butane	9.186	5.188	4.079
2,2 Dimethylpropane	0.162	0.111	0.089
Isopentane	5.289	3.465	2.915
n-Pentane	4.997	3.245	2.754
2,2 Dimethylbutane	0.227	0.170	0.150
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.426	0.312	0.280
2 Methylpentane	2.226	1.655	1.466
3 Methylpentane	1.299	0.950	0.855
n-Hexane	3.060	2.253	2.014
Methylcyclopentane	0.936	0.594	0.602
Benzene	0.323	0.162	0.193
Cyclohexane	0.869	0.530	0.558
2-Methylhexane	1.452	1.209	1.111
3-Methylhexane	1.077	0.886	0.824
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.724	0.584	0.549
n-Heptane	2.101	1.736	1.608
Methylcyclohexane	2.234	1.609	1.676
Toluene	0.511	0.307	0.360
Other C-8's	3.731	3.238	3.141
n-Octane	1.635	1.500	1.426
E-Benzene	0.294	0.203	0.238
M & P Xylenes	0.594	0.413	0.482
O-Xylene	0.467	0.318	0.379
Other C-9's	2.333	2.261	2.250
n-Nonane	1.306	1.316	1.279
Other C-10's	3.089	3.290	3.334
n-decane	1.004	1.104	1.091
Undecanes(11)	3.148	3.441	3.535
Dodecanes(12)	2.337	2.758	2.874
Tridecanes(13)	2.127	2.693	2.844
Tetradecanes(14)	1.735	2.352	2.518
Pentadecanes(15)	1.442	2.094	2.269
Hexadecanes(16)	1.091	1.693	1.849
Heptadecanes(17)	0.940	1.542	1.701
Octadecanes(18)	0.810	1.400	1.553
Nonadecanes(19)	0.756	1.360	1.518
Eicosanes(20)	0.585	1.094	1.228
Heneicosanes(21)	0.465	0.916	1.035
Docosanes(22)	0.459	0.942	1.070
Tricosanes(23)	0.324	0.690	0.788
Tetracosanes(24)	0.349	0.769	0.883
Pentacosanes(25)	0.214	0.489	0.564
Hexacosanes(26)	0.205	0.486	0.562
Heptacosanes(27)	0.239	0.587	0.682
Octacosanes(28)	0.170	0.432	0.504
Nonacosanes(29)	0.177	0.465	0.544
Triacotanes(30)	0.124	0.337	0.395
Hentriacotanes Plus(31+)	5.353	22.797	28.010
Total	100.000	100.000	100.000

Oil Storage Tanks

Emission Unit ID: 31S - 34S Emission Point ID: 31E - 34E Control Device:1C

```

*****
* Project Setup Information
*****
Project File           : T:\Customers\Cunningham Energy\Air\160687 - King Facility\1. Application\OST C
Flowsheet Selection   : Oil Tank with Separator
Calculation Method     : RVP Distillation
Control Efficiency     : 0.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name             : Cunningham Energy, LLC
Well Name              : Cochran Pad
Well ID                : Oil Storage Tanks
Date                   : 2017.03.17

```

```

*****
* Data Input
*****
Separator Pressure     : 174.00[psig]
Separator Temperature   : 72.00[F]
Ambient Pressure       : 14.70[psia]
Ambient Temperature    : 60.00[F]
C10+ SG                : 0.8485
C10+ MW                 : 295.90

```

```

-- Low Pressure Oil -----
No.    Component          mol %
1      H2S                0.0000
2      O2                 0.0000
3      CO2                0.0000
4      N2                 0.0360
5      C1                 3.5710
6      C2                 7.2560
7      C3                 11.1570
8      i-C4               3.3760
9      n-C4               9.3480
10     i-C5               5.2890
11     n-C5               4.9970
12     C6                 4.1790
13     C7                 7.1590
14     C8                 7.6010
15     C9                 3.6390
16     C10+              27.1430
17     Benzene            0.3230
18     Toluene            0.5110
19     E-Benzene          0.2940
20     Xylenes            1.0610
21     n-C6               3.0600
22     224Trimethylp     0.0000

```

```

-- Sales Oil -----
Production Rate        : 10[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity             : 49.84
Reid Vapor Pressure    : 6.63[psia]

```

```

*****
* Calculation Results
*****

```

```

-- Emission Summary -----
Item          Uncontrolled    Uncontrolled
              [ton/yr]       [lb/hr]

```

Total HAPs	0.470	0.107
Total HC	61.179	13.968
VOCs, C2+	58.823	13.430
VOCs, C3+	49.850	11.381

Flash, standing, and working losses are sent directly to a Vapor Recovery System. Per WVDEP Vapor Recovery Systems receive a control efficiency of 95%

Uncontrolled Recovery Info.		
Vapor	2.8700	[MSCFD]
HC Vapor	2.8700	[MSCFD]
GOR	287.00	[SCF/bbl]

-- Emission Composition --		
No	Component	Uncontrolled
		[ton/yr]
		Uncontrolled
		[lb/hr]
1	H2S	0.000
2	O2	0.000
3	CO2	0.000
4	N2	0.000
5	C1	0.041
6	C2	2.356
7	C3	8.973
8	i-C4	20.149
9	n-C4	6.858
10	i-C5	14.877
11	n-C5	3.688
12	C6	2.528
13	C7	0.692
14	C8	0.419
15	C9	0.146
16	C10+	0.025
17	Benzene	0.000
18	Toluene	0.038
19	E-Benzene	0.018
20	Xylenes	0.004
21	n-C6	0.011
22	224Trimethylp	0.397
	Total	0.000
		13.977

-- Stream Data --							
No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas
			mol %	mol %	mol %	mol %	mol %
							Total Emissions
							mol %
1	H2S		0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	34.80	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000
4	N2	44.01	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	28.01	0.0360	0.0003	0.0000	0.0000	0.0000
6	C2	16.04	3.5710	0.0954	0.0000	0.1553	0.0020
7	C3	30.07	7.2560	1.1189	0.0000	15.1777	0.6932
8	i-C4	44.10	11.1570	4.9794	0.0705	27.7507	8.1294
9	n-C4	58.12	3.3760	2.6220	0.7639	31.7868	35.7399
10	i-C5	58.12	9.3480	8.3346	4.7076	5.8938	14.2655
11	n-C5	72.15	5.2890	5.9434	6.0965	12.7322	31.0623
12	C6	72.15	4.9970	5.8406	6.2456	3.1036	4.9840
13	C7	86.16	4.1790	5.2744	5.9951	2.1799	3.3028
14	C8	100.20	7.1590	9.2225	10.6292	0.5210	0.7585
15	C9	114.23	7.6010	9.8534	11.4052	0.2679	0.4082
16	C10+	128.28	3.6390	4.7252	5.4759	0.0793	0.1291
17	Benzene	295.90	27.1430	35.2709	40.8997	0.0116	0.0215
18	Toluene	78.11	0.3230	0.4106	0.4691	0.0000	0.0000
19	E-Benzene	92.13	0.5110	0.6604	0.7629	0.0304	0.0443
20	Xylenes	106.17	0.2940	0.3814	0.4418	0.0120	0.0185
21	n-C6	106.17	1.0610	1.3769	1.5949	0.0020	0.0033
22	224Trimethylp	86.18	3.0600	3.8896	4.4421	0.0062	0.0103
		114.24	0.0000	0.0000	0.0000	0.2896	0.4271
						0.0000	0.0000
	MW		131.01	158.09	174.98	40.57	52.28
	Stream Mole Ratio		1.0000	0.7696	0.6636	0.2304	44.26
	Heating Value	[BTU/SCF]					0.3364
	Gas Gravity	[Gas/Air]				2323.65	2520.82
	Bubble Pt. @ 100F	[psia]	197.87	31.05	7.36	1.40	1.80
							1.53

RVP @ 100F	[psia]	65.57	20.15	6.74
Spec. Gravity @ 100F		0.674	0.691	0.698

Oil Storage Tanks

Emission Unit ID: 2S - 13S

Emission Point ID: 2E - 13E

Control Device: 1C

* Project Setup Information *****

Project File : T:\Customers\Cunningham Energy\Air\151543 - Cochran Pad\1. Application\OST Ca
 Flowsheet Selection : Oil Tank with Separator
 Calculation Method : RVP Distillation
 Control Efficiency : 0.0%
 Known Separator Stream : Low Pressure Oil
 Entering Air Composition : No

Filed Name : Cunningham Energy, LLC
 Well Name : Cochran Pad
 Well ID : Oil Storage Tanks
 Date : 2017.02.08

* Data Input *****

Separator Pressure : 174.00[psig]
 Separator Temperature : 72.00[F]
 Ambient Pressure : 14.70[psia]
 Ambient Temperature : 60.00[F]
 C10+ SG : 0.8485
 C10+ MW : 295.90

-- Low Pressure Oil -----

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0000
4	N2	0.0360
5	C1	3.5710
6	C2	7.2560
7	C3	11.1570
8	i-C4	3.3760
9	n-C4	9.3480
10	i-C5	5.2890
11	n-C5	4.9970
12	C6	4.1790
13	C7	7.1590
14	C8	7.6010
15	C9	3.6390
16	C10+	27.1430
17	Benzene	0.3230
18	Toluene	0.5110
19	E-Benzene	0.2940
20	Xylenes	1.0610
21	n-C6	3.0600
22	224Trimethylp	0.0000

-- Sales Oil -----

Production Rate : 5[bbl/day]
 Days of Annual Operation : 365 [days/year]
 API Gravity : 49.84
 Reid Vapor Pressure : 6.63[psia]

* Calculation Results *****

-- Emission Summary -----

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
------	--------------------------	-------------------------

Total HAPs	0.230	0.053
Total HC	30.590	6.984
VOCs, C2+	29.411	6.715
VOCs, C3+	24.925	5.691

Flash, standing, and working losses are sent directly to a Vapor Recovery System. Per WVDEP Vapor Recovery Systems receive a control efficiency of 95%.

Uncontrolled Recovery Info.		
Vapor	1.4400	[MSCFD]
HC Vapor	1.4300	[MSCFD]
GOR	288.00	[SCF/bbl]

-- Emission Composition --			
No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.021	0.005
6	C2	1.178	0.269
7	C3	4.487	1.024
8	i-C4	10.074	2.300
9	n-C4	3.429	0.783
10	i-C5	7.439	1.698
11	n-C5	1.844	0.421
12	C6	1.264	0.289
13	C7	0.346	0.079
14	C8	0.209	0.048
15	C9	0.073	0.017
16	C10+	0.013	0.003
17	Benzene	0.000	0.000
18	Toluene	0.019	0.004
19	E-Benzene	0.009	0.002
20	Xylenes	0.002	0.000
21	n-C6	0.006	0.001
22	224Trimethylp	0.198	0.045
	Total	0.000	0.000
		30.611	6.989

-- Stream Data --								
No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
1	H2S	34.80	mol %	mol %	mol %	mol %	mol %	mol %
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	16.04	0.0360	0.0003	0.0000	0.0000	0.0000	0.0000
6	C2	30.07	3.5710	0.0954	0.0000	0.1553	0.0020	0.1070
7	C3	44.10	7.2560	1.1189	0.0002	15.1777	0.6932	10.6169
8	i-C4	58.12	11.1570	4.9794	0.0705	27.7507	8.1294	21.5724
9	n-C4	58.12	3.3760	2.6220	0.7639	31.7868	35.7399	33.0316
10	i-C5	72.15	9.3480	8.3346	4.7076	5.8938	14.2655	8.5299
11	n-C5	72.15	5.2890	5.9434	6.0965	12.7322	31.0623	18.5039
12	C6	72.15	4.9970	5.8406	6.2456	3.1036	4.9840	3.6957
13	C7	86.16	4.1790	5.2744	5.9951	2.1799	3.3028	2.5334
14	C8	100.20	7.1590	9.2225	10.6292	0.5210	0.7585	0.5958
15	C9	114.23	7.6010	9.8534	11.4052	0.2679	0.4082	0.3121
16	C10+	128.28	3.6390	4.7252	5.4759	0.0793	0.1291	0.0950
17	Benzene	295.90	27.1430	35.2709	40.8997	0.0116	0.0215	0.0147
18	Toluene	78.11	0.3230	0.4106	0.4691	0.0000	0.0000	0.0000
19	E-Benzene	92.13	0.5110	0.6604	0.7629	0.0304	0.0443	0.0348
20	Xylenes	106.17	0.2940	0.3814	0.4418	0.0120	0.0185	0.0140
21	n-C6	106.17	1.0610	1.3769	1.5949	0.0020	0.0033	0.0024
22	224Trimethylp	86.18	3.0600	3.8896	4.4421	0.0062	0.0103	0.0075
		114.24	0.0000	0.0000	0.0000	0.2896	0.4271	0.3329
						0.0000	0.0000	0.0000
	MW		131.01	158.09	174.98	40.57	52.28	44.26
	Stream Mole Ratio		1.0000	0.7696	0.6636	0.2304	0.1059	0.3364
	Heating Value	[BTU/SCF]				2323.65	2949.83	2520.82
	Gas Gravity	[Gas/Air]				1.40	1.80	1.53
	Bubble Pt. @ 100F	[psia]	197.87	31.05	7.36			

RVP @ 100F	[psia]	65.57	20.15	6.74
Spec. Gravity @ 100F		0.674	0.691	0.698

Water Storage Tanks

Emission Unit ID: 35S - 37S Emission Point ID: 35E - 37E Control Device: 1C

```
*****
* Project Setup Information
*****
Project File           : T:\Customers\Cunningham Energy\Air\160687 - King Facility\1. Application\OST
Flowsheet Selection   : Oil Tank with Separator
Calculation Method     : RVP Distillation
Control Efficiency     : 0.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name             : Cunningham Energy, LLC
Well Name              : Cochran Pad
Well ID                : Oil Storage Tanks
Date                   : 2017.03.17
```

```
*****
* Data Input
*****
Separator Pressure     : 174.00 [psig]
Separator Temperature  : 72.00 [F]
Ambient Pressure       : 14.70 [psia]
Ambient Temperature    : 60.00 [F]
C10+ SG                : 0.8485
C10+ MW                : 295.90
```

```
-- Low Pressure Oil --
No. Component mol %
1 H2S 0.0000
2 O2 0.0000
3 CO2 0.0000
4 N2 0.0000
5 C1 0.0360
6 C2 3.5710
7 C3 7.2560
8 i-C4 11.1570
9 n-C4 3.3760
10 i-C5 9.3480
11 n-C5 5.2890
12 C6 4.9970
13 C7 4.1790
14 C8 7.1590
15 C9 7.6010
16 C10+ 3.6390
17 Benzene 27.1430
18 Toluene 0.3230
19 E-Benzene 0.5110
20 Xylenes 0.2940
21 n-C6 1.0610
22 224Trimethylp 3.0600
0.0000
```

```
-- Sales Oil --
Production Rate : 20 [bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 49.84
Reid Vapor Pressure : 6.63 [psia]
```

```
*****
* Calculation Results
*****
```

```
-- Emission Summary --
Item Uncontrolled Uncontrolled
[ton/yr] [lb/hr]
```

Total HAPs	0.930	0.212
Total HC	122.358	27.936
VOCs, C2+	117.646	26.860
VOCs, C3+	99.700	22.763

Uncontrolled Recovery Info.		
Vapor	5.7500	[MSCFD]
HC Vapor	5.7400	[MSCFD]
GOR	287.50	[SCF/bbl]

Water storage tank emissions were calculated using crude oil/condensate properties and water production rate. Emissions are then estimated at one percent of the calculated value.

Flash, standing, and working losses are sent directly to a Vapor Recovery System. Per WVDEP Vapor Recovery Systems receive a control efficiency of 95%.

-- Emission Composition --			
No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.083	0.019
5	C1	4.712	1.076
6	C2	17.946	4.097
7	C3	40.297	9.200
8	i-C4	13.716	3.132
9	n-C4	29.755	6.793
10	i-C5	7.377	1.684
11	n-C5	5.057	1.155
12	C6	1.385	0.316
13	C7	0.838	0.191
14	C8	0.292	0.067
15	C9	0.050	0.011
16	C10+	0.000	0.000
17	Benzene	0.075	0.017
18	Toluene	0.036	0.008
19	E-Benzene	0.007	0.002
20	Xylenes	0.022	0.005
21	n-C6	0.794	0.181
22	224Trimethylp	0.000	0.000
	Total	122.442	27.955

-- Stream Data --									
No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total	Emissions
1	H2S	34.80	mol %	mol %	mol %	mol %	mol %	mol %	
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
3	CO2	44.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
5	C1	16.04	0.0360	0.0003	0.0000	0.1553	0.0000	0.0000	
6	C2	30.07	3.5710	0.0954	0.0000	0.0000	0.0020	0.1070	
7	C3	44.10	7.2560	1.1189	0.0002	15.1777	0.6932	10.6169	
8	i-C4	58.12	11.1570	4.9794	0.0705	27.7507	8.1294	21.5724	
9	n-C4	58.12	3.3760	2.6220	0.7639	31.7868	35.7399	33.0316	
10	i-C5	72.15	9.3480	8.3346	4.7076	5.8938	14.2655	8.5299	
11	n-C5	72.15	5.2890	5.9434	6.0965	12.7322	31.0623	18.5039	
12	C6	72.15	4.9970	5.8406	6.0965	3.1036	4.9840	3.6957	
13	C7	86.16	4.1790	5.2744	5.9951	2.1799	3.3028	2.5334	
14	C8	100.20	7.1590	9.2225	10.6292	0.5210	0.7585	0.5958	
15	C9	114.23	7.6010	9.8534	11.4052	0.2679	0.4082	0.3121	
16	C10+	128.28	3.6390	4.7252	5.4759	0.0793	0.1291	0.0950	
17	Benzene	295.90	27.1430	35.2709	40.8997	0.0116	0.0215	0.0147	
18	Toluene	78.11	0.3230	0.4106	0.4691	0.0000	0.0000	0.0000	
19	E-Benzene	92.13	0.5110	0.6604	0.7629	0.0304	0.0443	0.0348	
20	Xylenes	106.17	0.2940	0.3814	0.4418	0.0120	0.0185	0.0140	
21	n-C6	106.17	1.0610	1.3769	1.5949	0.0020	0.0033	0.0024	
22	224Trimethylp	86.18	3.0600	3.8896	4.4421	0.0062	0.0103	0.0075	
		114.24	0.0000	0.0000	0.0000	0.2896	0.4271	0.3329	
						0.0000	0.0000	0.0000	
	MW		131.01	158.09	174.98	40.57	52.28	44.26	
	Stream Mole Ratio		1.0000	0.7696	0.6636	0.2304	0.1059	0.3364	
	Heating Value	[BTU/SCF]				2323.65	2949.83	2520.82	
	Gas Gravity	[Gas/Air]				1.40	1.80	1.53	
	Bubble Pt. @ 100F	[psia]	197.87	31.05	7.36				

RVP @ 100F	[psia]	65.57	20.15	6.74
Spec. Gravity @ 100F		0.674	0.691	0.698

Water Storage Tanks

Emission Unit ID: 16S - 27S

Emission Point ID: 16E - 27E

Control Device: 1C

 * Project Setup Information

Project File : T:\Customers\Cunningham Energy\Air\151543 - Cochran Pad\1. Application\OST Ca
 Flowsheet Selection : Oil Tank with Separator
 Calculation Method : RVP Distillation
 Control Efficiency : 0.0%
 Known Separator Stream : Low Pressure Oil
 Entering Air Composition : No

Filed Name : Cunningham Energy, LLC
 Well Name : Cochran Pad
 Well ID : Oil Storage Tanks
 Date : 2017.02.08

 * Data Input

Separator Pressure : 174.00 [psig]
 Separator Temperature : 72.00 [F]
 Ambient Pressure : 14.70 [psia]
 Ambient Temperature : 60.00 [F]
 C10+ SG : 0.8485
 C10+ MW : 295.90

-- Low Pressure Oil

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0000
4	N2	0.0360
5	C1	3.5710
6	C2	7.2560
7	C3	11.1570
8	i-C4	3.3760
9	n-C4	9.3480
10	i-C5	5.2890
11	n-C5	4.9970
12	C6	4.1790
13	C7	7.1590
14	C8	7.6010
15	C9	3.6390
16	C10+	27.1430
17	Benzene	0.3230
18	Toluene	0.5110
19	E-Benzene	0.2940
20	Xylenes	1.0610
21	n-C6	3.0600
22	224Trimethylp	0.0000

-- Sales Oil

Production Rate : 3 [bbl/day]
 Days of Annual Operation : 365 [days/year]
 API Gravity : 49.84
 Reid Vapor Pressure : 6.63 [psia]

 * Calculation Results

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]

Total HAPs	0.140	0.032
Total HC	18.354	4.190
VOCs, C2+	17.647	4.029
VOCs, C3+	14.955	3.414

Water storage tank emissions were calculated using crude oil/condensate properties and water production rate. Emissions are then estimated at one percent of the calculated value.

Uncontrolled Recovery Info.			
Vapor	861.8000	x1E-3	[MSCFD]
HC Vapor	860.8700	x1E-3	[MSCFD]
GOR	287.27		[SCF/bbl]

Flash, standing, and working losses are sent directly to a Vapor Recovery System. Per WVDEP Vapor Recovery Systems receive a control efficiency of 95%.

-- Emission Composition --			
No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.012	0.003
5	C1	0.707	0.161
6	C2	2.692	0.615
7	C3	6.045	1.380
8	i-C4	2.057	0.470
9	n-C4	4.463	1.019
10	i-C5	1.107	0.253
11	n-C5	0.759	0.173
12	C6	0.208	0.047
13	C7	0.126	0.029
14	C8	0.044	0.010
15	C9	0.008	0.002
16	C10+	0.000	0.000
17	Benzene	0.011	0.003
18	Toluene	0.005	0.001
19	E-Benzene	0.001	0.000
20	Xylenes	0.003	0.001
21	n-C6	0.119	0.027
22	224Trimethylp	0.000	0.000
	Total	18.367	4.193

-- Stream Data --								
No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
1	H2S	34.80	mol %	mol %	mol %	mol %	mol %	mol %
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	N2	28.01	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	16.04	0.0360	0.0003	0.0000	0.1553	0.0020	0.0000
6	C2	30.07	3.5710	0.0954	0.0000	15.1777	0.6932	0.1070
7	C3	44.10	7.2560	1.1189	0.0002	27.7507	8.1294	10.6169
8	i-C4	58.12	11.1570	4.9794	0.0705	31.7868	8.1294	21.5724
9	n-C4	58.12	3.3760	2.6220	0.7639	5.8938	35.7399	33.0316
10	i-C5	72.15	9.3480	8.3346	4.7076	12.7322	14.2655	8.5299
11	n-C5	72.15	5.2890	5.9434	6.0965	3.1036	31.0623	18.5039
12	C6	86.16	4.9970	5.8406	6.2456	4.9840	3.6957	3.6957
13	C7	100.20	4.1790	5.2744	5.9951	2.1799	3.3028	2.5334
14	C8	114.23	7.1590	9.2225	10.6292	0.5210	0.7585	0.5958
15	C9	128.28	7.6010	9.8534	11.4052	0.2679	0.4082	0.3121
16	C10+	128.28	3.6390	4.7252	5.4759	0.0793	0.1291	0.0950
17	Benzene	295.90	27.1430	35.2709	40.8997	0.0116	0.0215	0.0147
18	Toluene	78.11	0.3230	0.4106	0.4691	0.0000	0.0000	0.0000
19	E-Benzene	92.13	0.5110	0.6604	0.7629	0.0304	0.0443	0.0348
20	Xylenes	106.17	0.2940	0.3814	0.4418	0.0120	0.0185	0.0140
21	n-C6	106.17	1.0610	1.3769	1.5949	0.0020	0.0033	0.0024
22	224Trimethylp	86.18	3.0600	3.8896	4.4421	0.0062	0.0103	0.0075
		114.24	0.0000	0.0000	0.0000	0.2896	0.4271	0.3329
						0.0000	0.0000	0.0000
	MW		131.01	158.09	174.98	40.57	52.28	44.26
	Stream Mole Ratio		1.0000	0.7696	0.6636	0.2304	0.1059	0.3364
	Heating Value	[BTU/SCF]				2323.65	2949.83	2520.82
	Gas Gravity	[Gas/Air]				1.40	1.80	1.53
	Bubble Pt. @ 100F	[psia]	197.87	31.05	7.36			

RVP @ 100F	[psia]	65.57	20.15	6.74
Spec. Gravity @ 100F		0.674	0.691	0.698

Attachment O

Cunningham Energy, LLC Cochran and King Pad

Monitoring, Recordkeeping, Reporting, and Testing Plans

Below is a summary of methods to comply with federal and state regulatory requirements for the Cochran and King Pad.

Production Throughput Standards:

1. Maximum condensate/crude oil throughput: 36,500 barrels per year.
2. Maximum produced water throughput: 35,040 barrels per year.
3. Maximum natural gas throughput: 47.45 million standard cubic feet per year.

Facility Standards:

1. Compressor engine will be fueled by natural gas only and operated per manufacturer instructions.
2. Reciprocating compressor rod packing will be replaced within 36 months of last packing/startup or within 26,000 operating hours, whichever comes first.
3. The combustor will be operated per manufacturer instructions.
4. Oil storage and produced water storage tanks emissions will be routed to the VRU with a recovery efficiency of 95%.
5. Oil and produced water storage tanks will be covered and routed to a closed vent system with no detectable emissions.
6. In the event of VRU downtime, oil storage and produced water storage tanks emissions will be routed to the back-up combustor with a destruction efficiency of 98%.

Monitoring:

1. Non-certified engines must be stack tested within 1 year of startup and every 8,760 hours of operation thereafter.
2. Compressor run time or number of months since compressor rod repacking will be monitored or tracked.
3. Initial Method 22 observation of the combustor will be conducted for a minimum of 2 hours.
4. Monthly Method 22 observations of the combustor will be conducted for a minimum of 10 minutes each.
5. Monthly olfactory, visual, and auditory inspections will be conducted of the tanks closed vent and VRU for leaks or defects that could result in emissions. Leaks will be repaired as soon as practicable, and no later than 5 days for first attempt.

Recordkeeping:

1. Monthly and rolling twelve-month average amount of oil, natural gas, and produced water out will be recorded.
2. Records of engine maintenance and engine run time will be kept.
3. Records of inspections, observations, preventative maintenance, malfunctions, stack testing, and shutdowns of all onsite equipment will be kept.

4. All records will be kept for a minimum of 5 years.

Reporting and Testing Plans:

1. An annual report of compliance with 40 CFR 60 Subpart OOOO for the compressors and storage tanks will be submitted within 90 days after one year of operation.
2. For stack testing, a protocol will be filed at least 30 days prior to test and WVDAQ and EPA will be notified of the test at least 15 days prior to test. Results will be reported within 60 days of the test (if applicable).
3. If operations are suspended for 60 days or more, WVDAQ will be notified within 2 weeks after the 60th day.

Attachment P

**Cunningham Energy, LLC
Cochran and King Pad**

**AIR QUALITY PERMIT NOTICE
Notice of Application**

Notice is given that **Cunningham Energy, LLC** has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 air permit for an oil and natural gas production facility located on **Shelton Rd near Bomont** in **Clay County, West Virginia**. The latitude and longitude coordinates are: **(38.427525,-81.220647)** The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: **Nitrogen Oxides = 4.314 TPY, Carbon Monoxide = 2.764 TPY, Particulate Matter-2.5 = 0.0 TPY, Particulate Matter-10 = 0.0 TPY, Volatile Organic Compounds = 56.5 TPY, Sulfur Dioxide = 0.004 TPY, Formaldehyde = .293 TPY, Benzene = 0.0218 TPY, Toluene = 0.0101 TPY, Ethylbenzene = 0.0023 TPY, Xylenes = 0.0065 TPY, Hexane = 0.2415 TPY, and Total Hazardous Air Pollutants = 0.6157 TPY.**

Startup of operation is planned to begin on or about **June (2017)**. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the **17th** day of **May, 2017**.

By: **Cunningham Energy, LLC
Ryan Cunningham
President
3230 Pennsylvania Ave.
Charleston, WV 25302**

Attachment R

Attachment R
AUTHORITY OF CORPORATION
OR OTHER BUSINESS ENTITY (DOMESTIC OR FOREIGN)

TO: The West Virginia Department of Environmental Protection,
Division of Air Quality

DATE: May 18, 2017

ATTN.: Director

Corporation's / other business entity's Federal Employer I.D. Number 26-2169186


The undersigned hereby files with the West Virginia Department of Environmental Protection, Division of Air Quality, a permit application and hereby certifies that the said name is a trade name which is used in the conduct of an incorporated business or other business entity.

Further, the corporation or the business entity certifies as follows:

(1) Ryan Cunningham (is/are) the authorized representative(s) and in that capacity may represent the interest of the corporation or the business entity and may obligate and legally bind the corporation or the business entity.

(2) The corporation or the business entity is authorized to do business in the State of West Virginia.

(3) If the corporation or the business entity changes its authorized representative(s), the corporation or the business entity shall notify the Director of the West Virginia Department of Environmental Protection, Division of Air Quality, immediately upon such change.



President or Other Authorized Officer
(Vice President, Secretary, Treasurer or other
official in charge of a principal business function of
the corporation or the business entity)

(If not the President, then the corporation or the business entity must submit certified minutes or bylaws stating legal authority of other authorized officer to bind the corporation or the business entity).

Secretary

Cunningham Energy, LLC

Name of Corporation or business entity